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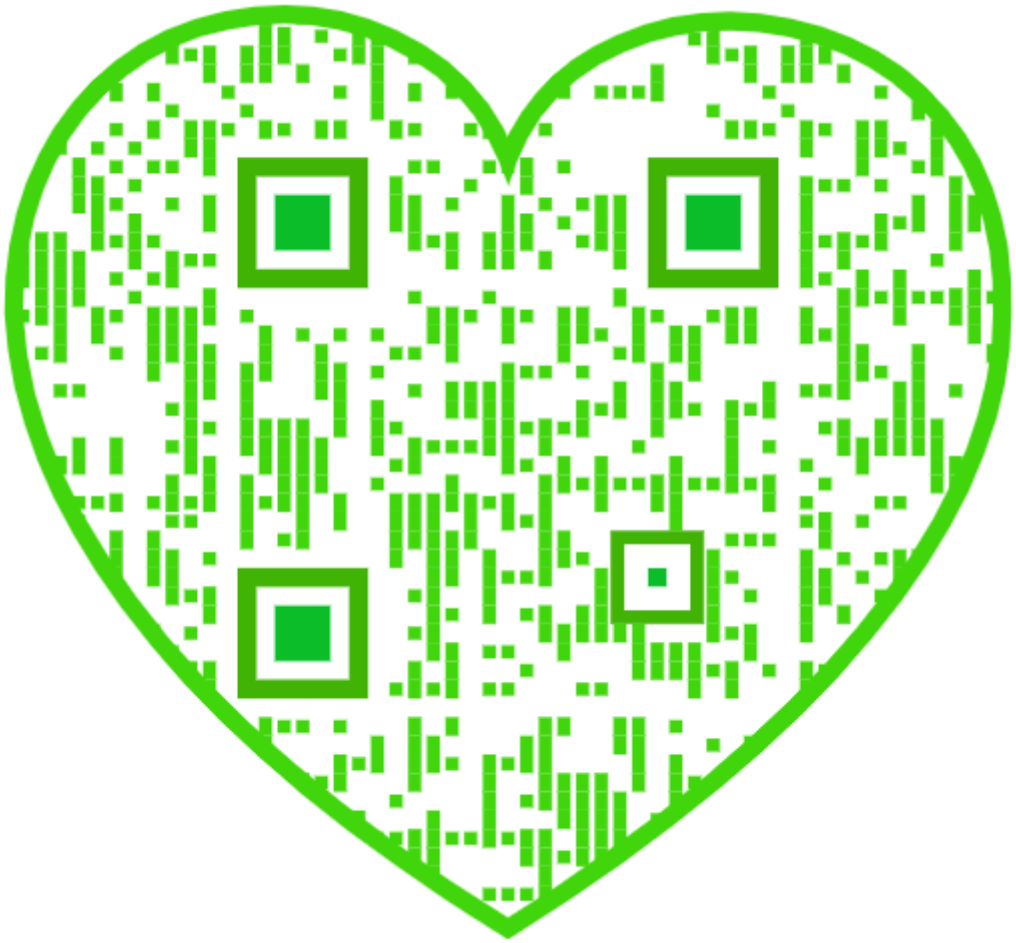

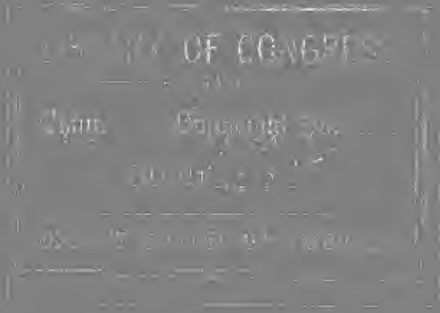

SHEEP:

THEIR

BREEDS, MANAGEMENT, AND DISEASES.

BY

WILLIAM YOUATT.

NEW EDITION.

WITH AN INTRODUCTION BY COL. M. C. WELD.

TO WHICH ARE ADDED

Remarks on the Breeds and Management of Sheep in the United States.

ILLUSTRATED.

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INTRODUCTION TO THE AMERICAN EDITION.

As a popular writer, Mr. Youatt has few superiors. A thoroughly practical man himself, he had the happy ability to render clear to his readers the important facts upon which he writes as they are presented to his own mind. Fond of history, he always gives to historical facts concerning the various breeds a prominent place, reasoning that knowledge of the steps by which any breed has been brought to the condition in which we find it, will enable breeders to follow out a judicious line of improvement. A veterinary surgeon, he brings a thorough knowledge of anatomy, and of the principles of medicine and surgery as applied to domestic animals, to aid him in instructing unprofessional men how to breed, rear, and care for their flocks. Thus the author was peculiarly adapted to his task, and it is not surprising that the public demand edition after edition of his works. There is much in Youatt's large work upon sheep, originally published by "The Society for the Diffusion of Useful Knowledge," of little or no interest to American sheep-raisers. This was wisely omitted by the American editor, the late Mr. Stevens, in the preparation of this work. Breeds of sheep are subject to constant variation. Fashion often dictates the development of unimportant characteristics, as well as the prominence of certain breeds. The general principles of the breeding and care of sheep remain fixed, as well as the history of the great improvements made in the mutton breeds. These give this work especial value, and in connection with the excellent hygienic views of the author, and his wise suggestions as to veterinary practice, render it a safe guide and companion to the flock-master.

The structure of the wool fibre, the fine serrations upon its surface, the relations between these serrations and the curls in the fibre, and the dependence of the felting property of wool and wooly furs upon the number and character of the serrations, were original discoveries of Mr. Youatt. This whole subject, admirably treated and fully illustrated as it is in this volume, gives it a great and permanent value to the wool-grower.

The economic importance of sheep to man, and their adaptation to his needs, excite our wonder and admiration. Semi-barbaric tribes clothe themselves with their pelts, and live upon their flesh and milk. The simple arts of spinning, weaving, and dyeing woolen fabrics existed among eastern nations from the first dawn of civilization down to the present time. The sheep follows man wherever he goes, except within the Arctic circle. Wherever barley will grow, sheep will thrive. One breed or another is found suited to advancing

conditions of society. Thus in new settlements remote from markets, the wool product is easily marketed, and has a standard value. It brings cash, and thus sheep are raised primarily for their wool. The country fills up, and a population not agricultural gathers in towns. This makes a home demand for mutton, and the sheep sought for will be those having heavy carcasses, while wool will have only a secondary value. With this demand for heavy sheep, comes that for the very best mutton, so that it will pay some sheep-breeders to cater to the demand of the market for such mutton as that yielded by the family of the "downs."

A change of the tariff in a few years affects changes in the character of the sheep raised and the wool grown. Demands of manufacturers tend at once to produce similar but less lasting effects. So the sheep accommodates itself to our civilization and the demands of society upon it; its fleece varying from coarse hair, and a long, wavy, glossy but coarse wool, to wool of such extreme delicacy, that fabrics produced from it possess a softness that rivals even moleskin. Youatt found that the diameter of good Spanish Merino wool averaged about $^1/_{750}$th of an inch, and we believe that wools measuring only $^1/_{1000}$th of an inch are not uncommon.

Mutton has never been a favorite article of diet with Americans until within recent years—the wool-bearing breeds having given place to the more particularly mutton breeds of Great Britain. Now, however, we are fast becoming, like the Mother Country, a mutton-eating people, and really good mutton commands remunerative, and often very high, prices in all our markets. Occasionally, at certain seasons, there are large importations of heavy carcasses.

The position of the sheep in our agriculture is not what it should be. Thousands of square miles of what is now waste land, in the midst of the longest settled parts of the country, might be used as sheep pastures, with the assurance of a triple profit in the wool, which should pay all expenses, in the mutton which might be set down in many cases as clear profit, and in the benefit to the land, which, under proper management, is always improved by the grazing of sheep upon it. This gives rise to a saying that for certain land the best practice is to "manure with the sheep's foot." Besides, sheep are not fastidious feeders. They winter well on wheat or oat-straw, with a modicum of grain or other feed. Their maladies with us are generally easy to control, and when farms are adapted to their convenient handling, are managed with great economy of time and labor. There are, indeed, no more inviting, and few, if any, more remunerative branches of husbandry.

YOUATT ON SHEEP.

CHAPTER I.

The Zoological Character of the Sheep.—Its various Names, according to Age.—The Marks by which its Age may be known.—Description of the Teeth.—Natural Age.

The sheep is classified by naturalists as belonging to the Order Ruminantia; the Tribe Capridæ; and the Genus Ovis. Of the Ovis there are three varieties: the Ovis Ammon or Argali; the Ovis Musmon; and the Ovis Aries, or Domestic Sheep. The last variety only will form the subject of this work.

There is considerable resemblance between the ovis or sheep, and the capra or goat, another genus of the tribe capridæ. The distinctions between them are briefly these: the horns of the sheep have a spiral direction, while those of the goat have a direction upward and backward; the sheep, except in one wild variety, has no beard, the goat is bearded; the goat, in his highest state of improvement, when he is made to produce wool of a fineness unequalled by the sheep, as in the Cashmere breed, is mainly, and always, externally covered with hair, while the hair on the sheep may, by domestication, be reduced to a few *kemps* (coarse hair), or got rid of altogether; and finally, the pelt or skin of the goat has thickness very far exceeding that of the sheep.

NAMES OF THE SHEEP.

Agriculturists have applied different names to the sheep, according to the age and sex.

The male is called a *ram* or *tup*. While with the mother he is denominated a *tup*, or *ram-lamb*, a *heeder*, and sometimes a *pur-lamb*. From the time of his weaning, and until he is shorn, he has a variety of names: he is called a *hog*, a *hogget*, a *hoggerel*, a *lamb-hog*, a *tup-hog*, or a *teg*; and; if castrated, a *wether-hog*. After shearing, when probably he is a year and a half old, he is called a *shearing*, a *shear-hog*, a *diamond* or *dinmont ram*, or *tup*; and a *shearing wether*, &c., when castrated. After the second shearing he is a *two-shear ram*, or *tup*, or *wether*; at the expiration of another year he is a *three-shear ram*, &c.; the name always taking its date from the time of shearing.

In many parts of the north of England and in Scotland he is a *tup-lamb* after he is salved, and until he is shorn, and then a *tup-hog* and, after that, a *tup*, or if castrated, a *dinmont* or a *wedder*.

The female is a *ewe*, or *gimmer-lamb*, until weaned; and then a *gimmer-hog*, or *ewe-hog*, or *teg*, or *sheeder ewe*. After being shorn she is a *shearing ewe* or *gimmer*, sometimes a *theave*, or *double-toothed ewe* or *teg;* and afterward a *two-shear*, a *three-shear*, or a *four* or *six-tooth ewe* or *theave*. In some of the northern districts, ewes that are barren, or that have weaned their lambs, are called *eild* or *yeld* ewes.

THE AGE OF THE SHEEP.

The age of sheep is not reckoned from the time that they are dropped, but from the first shearing, although the first year may thus include fifteen or sixteen months, and sometimes more.

When there is doubt about the age, recourse is had to the teeth, for there is more uncertainty about the horn in sheep than in cattle; and ewes that have been early bred from, will always, according to the rings on the horn, appear a year older than others that have been longer kept from the ram.

THE TEETH.

Sheep have no teeth in the upper jaw, but the bars or ridges of the palate thicken as they approach the forepart of the mouth there also the dense, fibrous, elastic matter, of which they are constituted, becomes condensed, and forms a cushion or bed that covers the converse extremity of the upper jaw, and occupies the place of the upper incisor or cutting teeth, and partially discharges their functions. The herbage is firmly held between the front teeth in the lower jaw and this pad, and thus partly bitten and partly torn asunder. The rolling motion of the head is a sufficient proof of this.

The teeth of the sheep are the same in number as in the mouth of the ox. There are eight incisor or cutting-teeth in the forepart of the lower jaw, and six molars in each jaw above and below, and on either side. The incisors are more admirably formed for grazing than in the ox. The sheep bites closer, and is destined to follow the ox, and gather nourishment where the ox would be unable to crop a single blade. The sheep, by his close bite, not only loosens the roots of the grass, and disposes them to spread, but by cutting off the short suckers and sproutings—a wise provision of nature—causes the plant to throw out fresh, and more numerous, and stronger ones, and thus improves and increases the value of the crop. Nothing will more expeditiously or more effectually make a thick, permanent pasture than its being occasionally and closely eaten down by sheep.

In order to enable the sheep to bite thus close, the upper lip is deeply divided, and free from hair about the centre of it. The part of the tooth above the gum is not only, as in other animals, covered with enamel, to enable it to bear and to preserve a sharpened edge, but the enamel on the upper part rises from the bone of the tooth nearly a quarter of an inch, and presenting a convex surface outward, and a concave within, forms a little scoop or gouge of wonderful execution.

The mouth of the lamb newly dropped is either without incisor teeth, or it has two. The teeth rapidly succeed to each other, and

before the animal is a month old he has the whole of the eight. They continue to grow with his growth until he is about fourteen or sixteen months old. In the accompanying cut, fig. 1 will give a fair

Fig. 1. Fig. 2. Fig. 3.

Fig. 4. Fig. 5. Fig. 6.

representation of the mouth of a sheep at this age. Then, with the same previous process of diminution as in cattle, or carried to a still greater degree, the two central teeth are shed, and attain their full growth when the sheep is two years old. Fig. 2 gives a delineation of the mouth at that age.

In examining a flock of sheep, however, there will often be very considerable difference in the teeth of the hogs, or the one-shears; in some measure to be accounted for by a difference in the time of lambing, and likewise by the general health and vigor of the animal. There will also be a material difference in different flocks, attributable to the good or bad keep which they have had.

Those fed on good land, or otherwise well kept, will take the start of others that have been half-starved, and renew their teeth some months sooner that these. There are, however exceptions to this; Mr. Price says that a Romney Marsh teg was exhibited at the show fair at Ashford, weighing 210 pounds, and the largest ever shown there of that breed, and that had not one of his permanent broad teeth.

There are also irregularities in the times of renewing the teeth, not to be accounted for by either of these circumstances; in fact, not to be accounted for by any known circumstance relating to the breed or the keep of the sheep. The same author remarks, that he has known tups have four broad and permanent teeth, when, according to their age, they ought to have had but two. Mr. Culley, in his excellent work on "Live Stock," says: "A friend of mine and an eminent breeder, Mr. Charge, of Cleasby, a few years ago showed a shearing-tup at Richmond, in Yorkshire, for the premium given by the Agricultural Society there, which had six broad teeth; in consequence of which the judges rejected his tup, although confessedly the best sheep, because they believed him to be more than a shearing: however, Mr. Charge afterward proved to their satisfaction that his tup was no more than a shearing." Mr. Price, on the

other hand, states that he "once saw a yearling wether, which became quite fat with only one tooth, that had worked a cavity in the upper jaw, the corresponding central tooth having been accidentally lost."

The want of improvement in sheep which is occasionally observed, and which can not be accounted for by any deficiency or change of food, may sometimes be justly attributed to the tenderness of the mouth when the permanent teeth are protruding through the gums.

Between two and three years old, the next two incisors are shed; and when the sheep is actually three years old, the four central teeth are fully grown (see fig. 3): at four years old, he has six teeth fully grown (see fig. 4): and at five years old all the teeth are perfectly developed (see fig. 6). This is one year before the horse or the ox can be said to be full-mouthed. The sheep is a much shorter-lived animal than the horse, and does not often attain the usual age of the ox.

The careless examiner may sometimes be deceived with regard to the four-year-old mouth. He will see the teeth perfectly developed, no diminutive ones at the sides, and the mouth apparently full; and then, without giving himself the trouble of counting the teeth, he will conclude that the sheep is five years old. A process of displacement, as well as of diminution, has taken place here: the remaining outside milk-teeth are not only shrunk to less than a fourth part of their original size, but the four-year-old teeth have grown before them and perfectly conceal them, unless the mouth is completely opened. Figure 5 represents this deceptive appearance.

After the permanent teeth have all appeared and are fully grown, there is no criterion as to the age of the sheep. In most cases, the teeth remain sound for one or two years, and then, at uncertain intervals, either on account of the hard work in which they have been employed, or from the natural effect of age, they begin to loosen and fall out; or, by reason of their natural slenderness, they are broken off. When favorite ewes, that have been kept for breeding, begin, at six or seven years old, to lose condition, their mouths should be carefully examined. If any of the teeth are loose, they should be extracted, and a chance given to the animal to show how far, by browsing early and late, she may be able to make up for the diminished number of her incisors. It will not unfrequently happen that ewes with broken teeth, and some with all the incisors gone, will keep pace in condition with the best in the flock; but they must be well taken care of in the winter, and, indeed, nursed to an extent that would scarcely answer the farmer's purpose to adopt as a general rule, in order to prevent them from declining to such a degree as would make it very difficult afterward to fatten them for the butcher. It may certainly be taken as a general rule that when sheep become broken-mouthed, they begin to decline.

It will probably appear, when the subjects of breeding and grazing are discussed, that it will be the most profitable course to fatten the ewes when they are five, or, at most, six years old, and supply their places with the most likely shearing-ewes. When a sheep gets much older than this, it begins to decline in its wool, and certainly

loses much of its propensity to fatten; while, in the usual system of sheep-husbandry, the principal profit consists in early and quick fattening.

Causes of which the farmer is utterly ignorant, or over which he has no control, will sometimes hasten the loss of the teeth. One thing, however, is certain—that close feeding, causing additional exercise of the teeth, does wear them down; and that the sheep of the farmers who stock unusually and unseasonably hard, lose their teeth much sooner than others do.

NATURAL AGE.

The natural age of the sheep is about ten years, to which age they will breed and thrive well; though there are instances of their breeding at the age of fifteen, and of living twenty years.

CHAPTER II.

The Structure of the Skin.—Anatomy of the Wool.—Hairy Covering of the Primitive Sheep.—The gradual Change from Hair to Wool.—The Yolk.—the Form of the Fibre.—The Properties of Wool.—Fineness.—Influence of Temperature.—Pasture.—Trueness.—Soundness.—Softness.

In order that the qualities and relative value of the different breeds of sheep may be duly estimated, it will be advantageous to devote a few pages to the consideration of the structure, varieties, and uses, of wool.

THE STRUCTURE OF THE SKIN.

The skin of the sheep, and of animals generally, is composed of three textures. Externally is the *cuticle*, or *scarf-skin*, which is thin, tough, devoid of feeling, and pierced by innumerable minute holes, through which pass the fibres of the wool and the insensible perspiration. It seems to be of a scaly texture; but this is not so evident in the sheep as in many other animals, on account of a peculiar substance, the yolk, which is placed on it, to nourish and protect the roots of the wool. It is, however, plainly enough to be seen in the scab and other cutaneous eruptions to which the sheep is liable.

Below this is the *rete mucosum*, a soft structure; its fibres having scarcely more consistence than mucilage, and being with great difficulty separated from the skin beneath. This seems to be placed as a defence to the terminations of the blood-vessels and nerves of the skin, and these are, in a manner, enveloped and covered by it. The color of the skin, and probably that of the hair or wool also, is determined by the rete mucosum; or, at least, the hair and wool are of the same color as this substance.

Beneath is the *cutis*, or *true skin*, composed of innumerable minute fibres crossing each other in every direction; highly elastic in order to fit closely to the parts beneath, and to yield to the various motions

of the body; and dense and firm in its structure, that it may resist external injury. Blood-vessels and nerves, countless in number, pierce it, and appear on its surface under the form of *papillæ*, or minute eminences, while, through thousands of little orifices, the exhalant absorbents pour out the superfluous or redundant fluid. The true skin is composed principally or almost entirely of gelatine; so that, although it may be dissolved by long-continued boiling, it is insoluble in water at the common temperature. This organization seems to have been given to it, not only for the sake of its preservation while on the living animal, but that it may afterward become useful to man.

The substance of the hide combines with the tanning principle, and is converted into leather.

The skin of the sheep seldom undergoes the full process of tanning, but it is prepared in a peculiar way, and used as a commoner sort of binding for books, or it is manufactured into parchment, and thus, on account of its durable nature, becomes most valuable as connected with the disposal and security of our property. Some of the foreign lambskins are much sought after, as a species of ornamental clothing, as well as on account of their comfort and warmth, and are prepared with the wool remaining on them.

ANATOMY OF THE WOOL.

On the skin of most animals is placed a covering of feather, fur, hair, or wool. They are all essentially the same in composition, being made up of an animal substance resembling coagulated albumen, and sulphur, silica, carbonate and phosphate of lime, and oxydes of iron and manganese.

Wool is not confined to the sheep. The under-hair of some goats is not only finer than the fleece of any sheep, but it occasionally has the crisped appearance of wool. It is, in fact, wool of different qualities in different breeds: in some rivalling or excelling that of the sheep, but in others very coarse.

A portion of wool is found also in many other animals, as in the deer, elk, the oxen of Tartary and Hudson's bay, the gnoo, the camel, many of the fur-clad animals, the sable, the polecat, and in several species of the dog.

HAIRY COVERING OF THE PRIMITIVE SHEEP.

Judging from the mixture of wool and hair in the coat of most animals, and the relative situation of these materials, it is not improbable that such was the character of the fleece of the primitive sheep. It has been asserted that the primitive sheep was entirely covered with hair, but is doubtless incorrect. There are at the present day varieties of the sheep occupying extensive districts, that are clothed outwardly with hair of different degrees of fineness and steekness; and underneath the external coat is a softer, shorter, and closer one, that answers to the description of fur, according to most travellers, but which really possesses all the characters of wool. It is therefore highly improbable that the sheep, which has now become, by culti-

vation, *par excellence, the wool-bearing animal*, should, in any country, at any time, have ever been entirely destitute of wool. Sheep of almost every variety have at times been in the gardens of the Zoological Society of London, but there has not been one on which a portion of crisped wool, although exceedingly small, has not been found at the bottom of the hair.

In all the regions over which the patriarchs wandered, and extending northward through the greater part of Europe and Asia, the sheep is externally covered with hair, but underneath is a fine, short, downy wool, from which the hair is easily separated. This is the case with the sheep at the cape of Good Hope, and also in South America.

In the "American Philosophical Transactions," vol. v., page 153, the Jamaica sheep is thus described: "The Jamaica sheep forms a distinct variety, altogether different from any other I have ever seen. The hair is a substance *sui generis*, and is as different from the kemp and stichet hair of Europe as from the long tough hair of the Russians and other hairy breeds. The wool, too, is as different from that of other sheep-wool as the hair; it is finer than any other, not excepting the Shetland breed, although I should suspect that it is scarcely so soft." It was, however, once asserted of this sheep, that it was altogether devoid of wool; and it has been still more lately and strangely maintained that British sheep, transported to Jamaica, would speedily lose their woolly coat, and become altogether hairy.

THE GRADUAL CHANGE FROM HAIR TO WOOL.

The change from hair to wool, though much influenced by temperature, has been chiefly effected by cultivation. Wherever these hairy sheep are now found, the management of that animal is in a most disgraceful state; and among the cultivated sheep the remains of this ancient hairy covering exist, to any great extent, among those alone that are comparatively neglected or abandoned.

THE YOLK.

The filament of the wool has scarcely pushed itself through the pore of the skin, when it has to penetrate through another and singular substance, which, from its adhesiveness and color, is called the YOLK. It is found in greatest quantity about the breast and shoulders—the very parts that produce the best, and healthiest, and most abundant wool—and in proportion as it extends to any considerable degree over other parts, the wool is then improved. It differs in quantity in different breeds: it is very abundant on the Merinoes; it is sufficiently plentiful on most of the southern breeds, either to assist in the production of the wool, or to defend the sheep from the inclemency of the weather; but in the northern districts, where the cold is more intense, and the yolk of wool is deficient, a substitute for it is sought by smearing the sheep with a mixture of tar and oil or butter. Where there is a deficiency of yolk, the fibre of the wool is dry, and harsh, and weak, and the whole fleece becomes thin and hairy; where the natural quantity of it is found, the wool is soft, and

oily, and plentiful, and strong. Precisely such, in a less degree, is the effect of the salving in suppling, and strengthening, and increasing the quantity of the wool.

It is not the inspissated perspiration of the animal; it is not composed of matter that has been accidently picked up and that has lodged in the wool; but it is a peculiar secretion from the glands of the skin, destined to be one of the agents in the nourishment of the wool, and, at the same time, by its adhesiveness, to mat the wool together, and form a secure defence from the wet and cold.

The medium quantity of yolk on a Hereford, Shropshire, or Sussex sheep, is about half the fleece; and this is the customary allowance to the wool-buyer, if the fleece has been sold without washing

A celebrated French chymist, M. Vauquelin, has made various experiments on the composition of the yolk of wool; the result is as follows: It is composed—first, of a soapy matter with a basis of potash, which formed the greater part of it; second, a small quantity of carbonate of potash; third, a perceptible quantity of acetate of potash; fourth, lime, whose state of combination he was unacquainted with; fifth, an atom of muriate of potash; sixth, an animal oil, to which he attributed the peculiar odor of the yolk; and, in conclusion, he was of opinion that all these materials were essential to the yolk, and not found in it by accident, for he analyzed the yolk in a great number of samples, as well Spanish as French, and found them in all.

The yolk being a true soap, soluble in water, it is easy to account for the comparative ease with which the sheep that have the natural proportion of it are washed in a running stream. There is, however, a small quantity of fatty matter in the fleece, which is not in combination with the alkali, and which, remaining attached to the wool, keeps it a little glutinous, notwithstanding the most careful washing.

THE FORM OF THE FIBRE.

The fibre of the wool having penetrated the skin and escaped from the yolk, is of a circular form, generally larger toward the extremity and also toward the root, and in some instances very considerably so.

The filaments of white wool, when cleaned from grease, are semi transparent; their surface in some places is beautifully polished, in others curiously incrusted, and they reflect the rays of light in a very pleasing manner. When viewed by the aid of a powerful achromatic microscope, the central part of the fibre has a singularly glittering appearance. Very irregularly-placed minuter filaments are sometimes seen branching from the main trunk, like boughs from the principal stem. This exterior polish varies much in different wools, and in wools from the same breed of sheep at different times. When the animal is in good condition and the fleece healthy, the appearance of the fibre is really brilliant; but when the state of the constitution is bad, the fibre has a dull appearance, and either a wan, pale light, or sometimes scarcely any, is reflected.

As a general rule, the filament is most transparent in the best and most useful wools, whether long or short. It increases with the im

provement of the breed, and the fineness and healthiness of the fleece; yet it must be acknowledged that some wools have different degrees of transparency and opacity, which do not appear to affect their value and utility. It is, however, the difference of transparency in the same fleece, or in the same filament, that is chiefly to be noticed as impairing the value of the wool.

THE PROPERTIES OF WOOL.

A consideration of the most important properties of wool, now taken in a very general way, and to be hereafter applied to the different breeds of sheep, can not be better introduced than in the words of Young, to whom the agriculturist, whatever department of husbandry may chiefly occupy his attention, is much indebted. He is speaking of the size of the fibre, or the fineness or coarseness of wool. "Fine and coarse," says he, "are but vague and general descriptions of wool; all fine fleeces have some coarse wool, and all coarse fleeces some fine. I shall endeavor, for the information of my readers, to distinguish the various qualities of wool in the order in which they are esteemed and preferred by the manufacturer. First, fineness with close ground, that is, thick-matted ground. Second, pureness. Third, straight-haired when broken by drawing. Fourth, elasticity, rising after compression in the hand. Fifth, staple not too long. Sixth, color. Seventh, what coarse is in it to be very coarse. Eighth, tenacity. Ninth, not much pitch-mark: but this is no other disadvantage than the loss of weight in scouring. The bad or disagreeable properties are—thin, grounded, toppy, curly-haired, and, if in a sorted state, little in it that is very fine; a tender staple. no elasticity, many dead white hairs, very yolky. Those who buy wool for combing and other light goods that do not want milling, wish to find length of staple, fineness of hair, whiteness, tenacity, pureness, elasticity, and not too many pitch-marks." These supposed good and bad qualities will not be taken in the order here enumerated, for the propriety of some of them may admit of doubt; few, however, will be entirely omitted.

FINENESS.

That property which first attracts attention, and which is of greater importance than any other, is the fineness of the pile—the quantity of fine wool which a fleece yields, and the degree of that fineness. Of the absolute fineness little can be said. It varies to a very considerable degree in different parts of the same fleece, and the diameter of the same fibre is often exceedingly different at the extremity and the centre. The micrometer has sometimes indicated that the diameter of the former is five times as much as that of the latter; and, consequently, that a given length of pile taken from the extremity would weigh twenty-five times as much as the same length taken from the centre and cleansed from all yolk and grease.

That fibre may be considered as coarse whose diameter is more than the five-hundredth part of an inch; in some of the most valuable samples of Saxony wool it has not exceeded the nine-hundredth

part of an inch; yet in some animals, but whose wool has not yet been used for manufacturing purposes, it is less than one twelve-hundredth part of an inch.

THE INFLUENCE OF TEMPERATURE.

The extremities of the wool, and frequently those portions which are near to the root, are larger than the intermediate parts. The extremity of the fibre has generally the greatest bulk of all. It is the product of summer soon after shearing-time; when the secretion of the matter of the wool is increased, and when the pores of the skin are relaxed and open, and permit a larger fibre to protrude. The portion near the root is the growth of spring, when the weather is getting warm; and the intermediate part is the offspring of winter, when under the influence of the cold the pores of the skin contract, and permit only a finer hair to escape.

If, however, the animal is well fed, the diminution of the bulk of the fibre will not be followed by weakness or decay, but in proportion as the pile becomes fine, the value of the fleece will be increased; but if cold and starvation should go hand in hand, the woolly fibre will not only diminish in bulk, but in health, and strength, and worth.

The variations in the diameter of the wool in different parts of the fibre will also curiously correspond with the degree of heat at the time the respective portions were produced. The fibre of the wool, and the record of the meteorologist will singularly agree, if the variations in temperature are sufficiently distant from each other for any appreciable part of the fibre to grow.

It will follow from this, that the natural tendency to produce wool of a certain fibre being the same, sheep in a hot climate will yield a comparatively coarse wool, and those in a cold climate will carry a finer, but at the same time a closer and a warmer fleece. In proportion to the coarseness of the fleece will generally be its openness, and its inability to resist either cold or wet; while the coat of softer, smaller, more pliable wool, will admit of no interstices between its fibres, and will bid defiance to frost and storms.

The natural instinct of the sheep would seem to teach the wool grower the advantage of attending to the influence of temperature on him. He is evidently impatient of heat. In the open districts, and where no shelter is near, he climbs to the highest parts of his walk, that if the rays of the sun must still fall on him he may nevertheless be cooled by the breeze; but if shelter is near, of whatever kind, every shaded spot is crowded with sheep.

Lord Somerville says: "The wool of our Merino sheep after shear-time is hard and coarse to such a degree as to render it almost impossible to suppose that the same animal could bear wool so opposite in quality, compared to that which had been clipped from it in the course of the same season. As the cold weather advances, the fleeces recover their soft quality." Enough will be said in the course of the work respecting the duty and the propriety of giving these useful animals, when placed in exposed situations some shel

ter from the driving storms of winter; and the alteration in the fibre of the wool shows that it would also be advisable to provide the flock with a shade and defence against the fervid rays of a meridian sun in the summer months.

PASTURE.

Pasture has a far greater influence on the fineness of the fleece. The staple of the wool, like every other part of the sheep, must increase in length or in bulk when the animal has a superabundance of nutriment; and, on the other hand, the secretion which forms the wool must decrease like every other, when sufficient nourishment is not afforded.

When little cold has been experienced in the winter, and vegetation has been scarcely checked, the sheep yields an abundant crop of wool, but the fleece is perceptibly coarser as well as heavier. When the frost has been severe and the ground long covered with snow—if the flock has been fairly supplied with nutriment, although the fleece may have lost a little in weight, it will have acquired a superior degree of fineness, and a proportional increase of value. Should, however, the sheep have been neglected and starved during this prolongation of cold weather, the fleece as well as the carcase is thinner, and although it may have preserved its smallness of filament, it has lost in weight, and strength, and usefulness.

TRUENESS.

Connected with fineness is trueness of staple—as equal a growth as possible over the animal—a freedom from the shaggy portions, here and there, which are occasionally observed on poor and neglected sheep. These portions are always coarse and comparatively worthless, and they indicate an irregular and unhealthy action of the secretion of wool, and which will probably weaken or render the fibre diseased in other parts.

Comprised in trueness of fibre is another circumstance that has been already alluded to—a freedom from coarse hairs which project above the general level of the wool in various parts, or, if they are not externally seen, mingle with the wool and debase its character.

SOUNDNESS.

Soundness is intimately connected with "trueness;" it means, generally, strength of the fibre, and also a freedom from those breaches or withered portions to which allusion has been made. The eye will readily detect the breaches; but the hair generally may not possess a degree of strength proportionate to its bulk. This is ascertained by drawing a few hairs out of the staple, and grasping each of them singly by both ends, and pulling them until they break.

The wool often becomes injured by felting while it is on the sheep's back. This is principally seen in the heavy breeds, especially those that are neglected and half starved. It generally begins in the winter season, when the coat has been completely saturated with water, and it increases until shearing-time, unless the cot separates from the wool beneath and drops off

Wool is generally injured by keeping. It will probably increase a little in weight for a few months, especially if kept in a damp place; but after that, it will somewhat rapidly become lighter, until a very considerable loss will often be sustained. This, however, is not the worst of the case; for, except very great care is taken, the moth will get into the bundles and injure, and destroy the staple: and that which remains untouched by them, will become considerably harsher and less pliable. If to this, the loss of the interest of money is added, it will be seen, that he seldom acts wisely who long hoards his wool, when he can obtain what approaches to a fair remunerating price for it.

SOFTNESS.

Softness of the wool, is evidently connected with the presence and quality of the yolk. This substance is undoubtedly designed not only to nourish the hair but to give it richness and pliability. The growth of the yolk ought to be promoted, and agriculturists ought to pay more attention to the quantity and quality of yolk possessed by the animals selected, for the purpose of breeding.

Bad management impairs the pliability of the wool, by arresting the secretion of the yolk. The softness of the wool, is also much influenced by the chymical elements of the soil.

A chalky soil notoriously deteriorates the softness of the wool on the sheep that graze there. Minute particles of the chalk being necessarily brought into contact with the fleece, and mixing with it, have a corrosive effect on the fibre, and harden it and render it less pliable. Many well-known facts render this highly probable. The business of the fell-monger furnishes a striking elucidation of this: his first proceeding is to separate the wool from the pelt; and in order to effect this he exposes it to the action of lime-water, and in a very short space of time the hair is shrivelled, killed, and easily scraped away.

In the living animal a process of the same kind, may be more gradually going forward, aided also by another, little suspected, yet highly injurious. The particles of chalk come in contact with the yolk—there is a chymical affinity between the alkali and the oily matter of the yolk—they immediately unite, and a true soap is formed. The first storm washes away a portion of it, and the wool, deprived of its natural pabulum and unguent, loses some of its vital properties, and its pliability among the rest. The slight degree of harshness which has been supposed to belong to the South-Down wools, may be accounted for in this way.

Mr. Bakewell's testimony deserves recording here. "I was led to the application of it," says he, "by observing the well-known effect produced on human hair, when daily washed with soap and water, and comparing it with the same hair less frequently washed, and sometimes rubbed with an ointment; by the former practice, it became hard and bristly, by the latter it was rendered soft and pliable. A little time after, an intelligent clothier in my neighborhood, who kept a small flock of fine-woolled sheep, informed me he had adopted

the practice of rubbing the sheep, with a mixture of butter and tar. He could speak decidedly to the improvement the wool had received by it, having superintended the whole process of the manufacture. The cloth produced was superior to what ungreased wool could have made, if equally fine; it was remarkably soft to the touch, and had what he called 'a good bottom, a good top, and a good hand and feel'—*i. e.*, the appearance of the threads was nearly lost in a firm even texture, covered with a soft full pile." Mr. Bakewell, adds, "a further investigation has given me the most ample and satisfactory proofs, that by the application of a well-chosen unguent, wool may be defended from the action of the soil and elements, and improved more than can be effected by any other means, except an entire change of breed." These are strong assertions, but no less strong than true, with regard to those breeds, and situations where salving is indicated.

CHAPTER III.

Felting.—The spirally curling Form of Wool.—The serrated Edge of Wool.—Long Wool.—Middle Wool.—Short Wool.

FELTING.

The felting property of wool is a tendency of the fibres to entangle themselves together, and to form a mass more or less difficult to unravel. By moisture and pressure the fibres of the wool may become matted or *felted* together into a species of cloth. The manufacture of felt was the first mode in which wool was applied to clothing, and felt is now universally used for hats. The fulling of flannels and broadcloths is effected by the felting principle. By the joint influence of the moisture and the pressure, certain of the fibres are brought into more intimate contact with each other; they cohere, not only the fibres, but, in a manner, the threads cohere, and the cloth is taken from the mill shortened in all its dimensions: it has become a kind of felt, for the threads have disappeared, and it can be cut in every direction with very little or no unravelling; it is altogether a thicker, warmer, softer fabric.

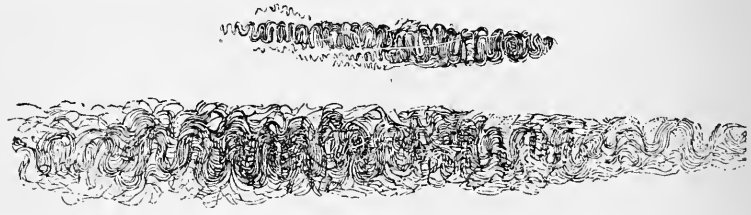
Many an ingenious theory has been brought forward in order to account for the process of felting. To the natural philosopher nothing was more easy of explanation. It was the attraction of cohesion; it was that power by which the particles of all bodies, when brought within insensible distances, are held together; it was an illustration of that universal law by which the system rolls entire. Take two leaden bullets; scrape a small portion from each; bring the smooth surfaces, although but of little extent, together; press them together with a kind of twist, and they cohere. Bring two plates of glass together perfectly level and clean, and they will adhere with considerable force. So the fibres of the wool, in these

manipulations, were supposed to be brought within the sphere of each other's attraction, and to have cohered.

The felting property of wool is one of the most valuable qualities it possesses, and on this property are the finer kinds of wool especially valued by the manufacturer for the finest broadcloths. This important characteristic will lead to a consideration of the various forms in the structure on which it depends.

THE SPIRALLY-CURLING FORM OF WOOL.

The most evident distinguishing quality between hair and wool is the comparative straightness of the former, and the crisped or spirally-curling form which the latter assumes. If a little lock of wool is held up to the light, every fibre of it is twisted into numerous minute corkscrew-like ringlets. This is seen especially in the fleece of the short-woolled sheep; but, although less striking, it is obvious even in wool of the longest staple. The subjoined cut will sufficiently illustrate this point.



The upper figure represents a lock of Saxon wool; the lower one is the delineation of a lock of Leicester wool, from a sheep of the improved breed.

The spirally-curling form of wool used, but erroneously, to be considered as the chief distinction between the covering of the goat and the sheep; but the under-coat of some of the former is finer than any sheep, and it is now acknowledged frequently to have the crisped and curled appearance of wool. In some breeds of cattle, particularly in one variety of the Devons, the hair assumes a curled and wavy appearance, and a few of the minute spiral ringlets have occasionally been seen. It is the same with many of the Highlanders, but there is no determination to take on the true crisped character and throughout its whole extent, and it is still nothing but hair. On some foreign breeds, however, as the yak of Tartary, and the ox of Hudson's bay, some fine and valuable wool is produced.

There is an intimate connexion between the fineness of the wool and the number of the curves, at least in sheep yielding wool of nearly the same length; so that whether the wool of different sheep is examined, or that from different parts of the same sheep, it is enough for the observer to take notice of the number of curves in a given space, in order to ascertain with sufficient accuracy the fineness of the fibre. M. Lafoun has published an account of the management of the German Merino sheep at Hohenheim, in Wurtemburg, and Schleisheim, near Munich. He says that the whole flock

is inspected three times in the year—before winter—when the selection of lambs is made, in the spring, and at shearing-time. Each sheep is placed in its turn on a kind of table, and examined carefully as to the growth, the elasticity, the pliability, the brilliancy, and the fineness of the wool. The latter is ascertained by means of a micrometer. It being found that there was an evident connexion between the fineness of the fibre and the number of curves, this was more accurately noted. The fineness of the first quality, the superlecta, or pick-lock, appears under the microscope to possess a fibre of $\frac{1}{840}$th of an inch in diameter, with from 27 to 2[illegible] curves to an inch. The number of curves diminish as the diameter of the fibre increases, so that in an inferior quality in which the fibre or staple is $\frac{1}{510}$th of an inch in diameter, the number of curves is from 12 to 13 in an inch of length.

Sufficient attention has not been given by the breeder to this curled form of the wool. It is, however, that on which its most valuable uses depend. It is that which is essential to it in the manufactory of cloths. The object of the carder is to break the wool to pieces at the curves—the principle of the thread is the adhesion of the particles together by their curves; and the fineness of the thread, and consequent fineness of the cloth, will depend on the minuteness of these curves, or the number of them found in a given length of fibre.

The wavy line in the above cut, has a pretty appearance, even in the Leicester; but the close spiral curls of the Saxon wool deserve particular attention. The person most uninformed on these subjects, will see at once why the Leicester wool is unadapted to clothing purposes. The particles into which it is broken by the card, could have little or no coherence—the greater part would be dissipated in the operation—and the remaining portions could not be induced so to nook themselves together as to form a thread possessing the slightest degree of strength. On the other hand, the close curls of the Saxon, explain the reason why, on one account at least, it is placed at the head of clothing wools.

It will readily be seen that this curling form, has much to do with the felting property of wool. It materially contributes to that disposition in the fibres which enables them to attach and entwine themselves together; it multiplies the opportunities for this interlacing, and it increases the difficulty of unravelling the felt.

THE SERRATED EDGE OF WOOL.

The felting property of wool is the most important as well as the distinguishing one; but it varies essentially in different breeds, and the usefulness and the consequent value of the fleece, at least for clothing purposes, depend on the degree to which it is possessed.

The serrated edge of wool, which has been discovered by means of the microscope, is also, as well as the spiral curl, deemed an important quality in the felting property of wool. Mr. Youatt gives an account of the first public view of the serrated edge, or saw-teeth-like appearance of the fibre of wool. A fibre was taken from a Merino fleece of three years' growth, and a microscope of 300

linear power was used. The fibre assumed a flattened riband-like form. The edges were hooked or serrated—they resembled the teeth of a fine saw, and were somewhat irregular. It was ascertained that there were 2,400 serrations in the space of an inch, and all of which projected in the same direction, viz., from the root to the point. Then, before we quitted the examination of the fibre as a transparent object, we endeavored to ascertain its actual diameter, and proved it to be $\frac{1}{750}$th of an inch.

1. A fibre of long Merino, viewed as a transparent object by the microscope.

2. Ditto, as an opaque one.

The long Merino Wool.

We next endeavored to explore the cause of this serrated appearance, and the nature of the irregularities on the surface, which might possibly account for the production of these tooth-like projections; we therefore took another fibre, and mounted it as an opaque object, and we were presented with a beautiful glittering column, with lines of division across it, in number and distance seemingly corresponding with the serrations that we had observed in the other fibre that had been viewed as a transparent object.

A fibre of Saxon wool was set up as a transparent object. This sheep is originally a Merino, but the fleece is much improved by careful management. Its felting property is superior to that of the Merino, and for some purposes it is more highly valued. The following cut exhibits the result:—

1. A fibre of Saxon wool as a transparent object.

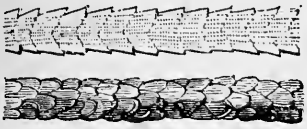
2. Ditto, as an opaque one.

Saxony Wool.

It is evidently a finer wool than the Merino; it is $\frac{1}{840}$th part of an inch in diameter. The serrations are as distinct; they are not quite so prominent, yet there is not much difference in this respect, and certainly not greater than the difference in the bulk of the fibre would produce. There is a little more irregularity in the distribution of the serrations; and after careful counting, there is an average of seventeen in each of the four divisions of the fibre. This number multiplied by four will give sixty-eight as the whole number in the field of view, and that multiplied by forty will yield a product of 2,720, the number of irregularities in the edge of the fibre in the space of an inch.

It is next viewed as an opaque object, and presents nearly the same appearance as the long Merino. The cups answer in number to the serrations, their edges project, and there is also an indication of a serrated edge; but as the fibre, and consequently the cup, is smaller, it is not so deep as in long Merino.

The next cut gives the microscopical appearance of some South-Down wool of a very fair and good quality. This is an exceedingly useful wool; but, on account of its inferior felting power, rarely used in the manufacture of fine cloths; in fact, it has been superseded by that which has been just described, and others of a similar quality.



1. A fibre of South-Down wool as a transparent object.

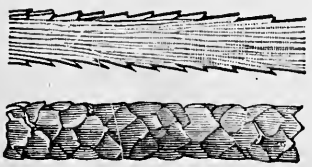
2. Ditto, as an opaque one.

South-Down Wool.

The fibre is evidently larger; it is the $\frac{1}{600}$th part of an inch. The serrations differ in character; these are larger, but they are not so acute—they almost appear as if they had been rounded; they have a rhomboidal, and not a hooked character, and they are evidently fewer in number in the same space. There are thirteen in each division, making, according to the mode of multiplication already pursued, 2,080 serrations in an inch, or 640 less than the Saxon.

It is made an opaque object: the cups answer in number to the serrations; they are more regularly distributed—they are not so prominent; and they show, what is now seen for the first time—the fibre being larger—that the cup is not composed of one continuous substance, but of numerous leaves, connected together, and probably overlapping each other. The serrations which were observed in the edge of the cups in the long Merino and the Saxon, are here resolvable into small leaves (three are visible); the vacancy, or angle between the tops of them, not being of any considerable depth.

The next wool that was subjected to examination was the Leicester—the unrivalled British long wool, and as useful, as indispensable for some purposes, as the finer wools already described are for others; and possessing (and therefore the better adapted for its own purposes) the felting property to a comparatively little extent.



1. A fibre of Leicester wool, as a transparent object.

2. Ditto, as an opaque one.

The Leicester Wool.

The fibre is considerably larger; it is $\frac{1}{500}$th of an inch. On account of its bulk, the little wavy lines about it give more decided indications of irregular external structure. The serrations are superficial—irregular, differently formed in different parts—a few like small spines, not projecting far from the surface, but running along it; other prominences are more rounded, and occasionally they give the idea of lying one upon another, as if two rods had been spliced together, with the end of one projecting beyond the

other. They were evidently fewer in numbe-; each quarter of th« field contained but eleven, amounting to only 1,860 in the space of an inch, or 220 less than the South-Down.

As an opaque object, the cups corresponded in number with the serrations, and the construction of the cup is more evident. It consists of from four to six leaves, rounded at the extremity, and with only a short point or spine protruding, and the leaves evidently lying closer to the body of the fibre.

There can no longer be a doubt with regard to the general outline of the woolly fibre. It consists of a central stem or stalk, probably hollow, or at least porous, and possessing a semi-transparency not found in the fibre of hair. From this central stalk there springs at different distances, in different breeds of sheep, a circlet of leaf-shaped projections.

LONG WOOL.

The most valuable of the long-woolled fleeces are of British origin. A considerable quantity is produced in France and Belgium, but the manufacturers in those countries acknowledge the superiority of the British wool. Long wool is distinguished, as its name would import, by the length of its staple. The average is about eight inches. It has much improved of late years, both in England and in other countries. Its staple has, without detriment to its manufacturing qualities, become shorter; but it has also become finer, and truer, and sounder. The long-woolled sheep has been improved more than any other breed; and, since the close of Mr. Bakewell's valuable life, who may justly be considered as the father of the Leicesters, the principal error which he committed has been repaired, and the long wool has progressively risen in value, at least for combing purposes. Some of the breeds have staples of double the length that has been mentioned as the average one. Pasture and breeding are the principal agents are.

Probably, because the Leicester blood prevails in, or at least mingles with every other long-woolled breed, there has been rapidly increasing, a great similarity in the appearance and quality of this fleece in every district. The short-woolled fleeces are, to a very considerable degree, unlike in fineness, elasticity, and in felting property; the sheep themselves are still more unlike: but the long wools are losing their distinctive points—the Lincoln has not all of his former gaunt carcass, and coarse and entangled wool; the Romney Marsh has got rid of a little of the roughness of his form, and the length of his leg, while his wool, possibly a little thinner, has become truer and finer; the Teeswater has, in a manner, disappeared; the Cotswold and the Bampton have become varieties of the Leicester: in fact, all the long-woolled sheep, both in appearance and in fleece, are becoming of one family; and rarely, except from culpable neglect in the breeder, the fleece has not been injuriously weakened, or too much shortened, for the most valuable purposes to which it is devoted.

In addition to its length, this wool is characterized by its strength

its transparency, its comparative stoutness, and the little degree in which it possesses the felting quality.

Since the extension of the process of combing to wools of a shorter staple, the application of this wool to manufacturing purposes has undergone considerable change. In some respects the range of its use has been limited; but its demand has, on the whole, increased, and its value is more highly appreciated. There are certain and important branches of the woollen manufacture in which it can never be superseded, and connected with which it will be considered to be the staple produce of Great Britain:—

> "If any wool, peculiar to our isle,
> Is given by nature, 'tis the comber's lock;
> The soft, the snow-white, and the long-grown flake."*

This long wool is classed under two divisions, distinguished both by length and the fineness of the fibre. The first, the long-combing wool, is used for the manufacture of hard yarn, and the worsted goods for which that thread is adapted, and requires the staple to be long, firm, and little disposed to felt. The short-combing wool has, as its name implies, a shorter staple, and is finer and more felty The felt is also closer and softer, and is chiefly used for hosiery goods.

MIDDLE WOOL.

The middle wool is almost a new article, but it is rapidly increasing in quantity and value. It will never supersede, but it will only stand next in estimation to the native British long fleece. It is yielded by the half-bred sheep, a race that will become more numerous every year, being a cross of the Leicester ram with the South-Down, or the Norfolk, or some other short-woolled ewe; retaining the fattening property and the early maturity of the Leicester, or of both; and the wool deriving length and toughness of fibre from the one, and fineness and feltiness from the other.

Norfolk and Suffolk are taking the lead in the cultivation of this valuable breed; but the practice is establishing itself in every part of the kingdom, where the pasture and other circumstances will permit the introduction of such a breed. The average length of staple is about five inches. There is no description of the finer stuff-goods in which this wool is not most extensively and advantageously employed; and the noils (the portions which are broken off by, and left in the comb, whether belonging to this description of wool or to the long wool) are used in the manufacture of several species of cloth of no inferior quality or value.

Under the head of middle wools must now be placed those that, when there were but two divisions, were known by the name of short wools; and, if we were treating of British productions alone, would still retain the same distinctive appellation. They are the South-Down, Norfolk, Suffolk, Dorset, Ryland, and Cheviot wools; together with the fleece of several other breeds, not so numerous, nor occupying so great an extent of country. From the change, how

* Dyer's Fleece, book ii.

ever, which has insensibly taken place in them all—the lengthening, and the increased thickness of the fibre, and more especially from the gradual introduction of other wools possessing delicacy of fibre, and pliability, and felting qualities, beyond what these could boast of, and, at the same time, being cheaper in the market than the old British wools ever were or could be—these have been gradually losing ground in the manufacture of the finer cloths, and now cease to be used in the production of them. On the other hand, the change which has taken place in the construction of machinery has multiplied the purposes to which they may be devoted, and very considerably enhanced their value. It may be a little mortifying to the grower of the British short wool, to find that neither the superior, nor even the middle classes of society, will condescend to wear the cloths produced from his material; but human ingenuity has not only brought good out of evil, but has increased the advantages previously possessed, and has placed the interests of the grower and the manufacturer of wool on a basis which no changes in fashion or commerce can ever more materially affect.

A few years ago, the grower of the British short wools considered them as devoted to clothing purposes alone. He not only would have thought them disgraced, if the comb had been applied in the preparation of them for the loom; but, if pressed on that point, he would have confessed that they would not bear the action of the comb. Now they rank among the combing-wools: they are prepared as much, and in some places more, by the comb, than by the card. On this account they meet with a readier sale; and although, perhaps, they will never more obtain an extravagant price, yet, considering the increased weight of each individual fleece, and also the increased weight and earlier maturity of the carcass, they will, in proportion to the value of other agricultural productions, and uninfluenced again by the changing character of the times, yield a fair remunerating price.

The qualities of these respective wools will be hereafter considered. The South-Down sheep yield nearly seven tenths of the pure short wool grown in the United Kingdom—the Dorsets, Rylands, Norfolks, &c., furnishing the remaining three tenths: but these proportions vary in different districts, and, as has been already intimated, the half-bred sheep is, in some parts of the country rapidly, and in all of them gradually, encroaching on the pure short-woolled one—beautiful and valuable as the latter is.

The average staple of the British short-woolled, or rather, now, of this description, of middle-woolled sheep, is three and a half inches.

Mr. Goodman, of Leeds, whose kindness the author particularly acknowledges, says that "these wools are now employed in flannels, army and navy cloths, friezed coatings, Petershams, bear-skin, and other coatings, heavy cloths for calico-printers and paper-manufacturers, woollen cords, coarse woollens, blankets, East-India army cloths, and other woollen articles, many of them adapted to the trade of the United Kingdom, and largely exported to North and South America, the East and West Indies, Germany, and other places

besides, for the same purposes, being partially used in cassinets, baizes, bockings, long ells, carpets, druggets, &c." Let the most enthusiastic admirer of the old short wools read this list, and say whether he has any reason to regret or to be ashamed of the change that has taken place.

SHORT WOOL.

From this division every wool of British production, save the Anglo-merino, may be considered as now excluded.

These wools are employed unmixed in the manufacture of the finer cloths, and combined with a small proportion of British wool in others of some inferior value. The average length of staple is about two and a half inches.

Even these wools may now be submitted to the action of the comb. There may be fibres only one inch in length; but if there are others from two and a half to three inches, so that the average of the staple shall be two inches, then a thread sufficiently tenacious may, from the improved state of machinery, be spun, and many delicate and beautiful fabrics, unknown a few years ago, readily woven.

CHAPTER IV.

The Leicester Sheep.—The best Long-Woolled Breed.—Improved by Mr. Bakewell.—Mode of Management.

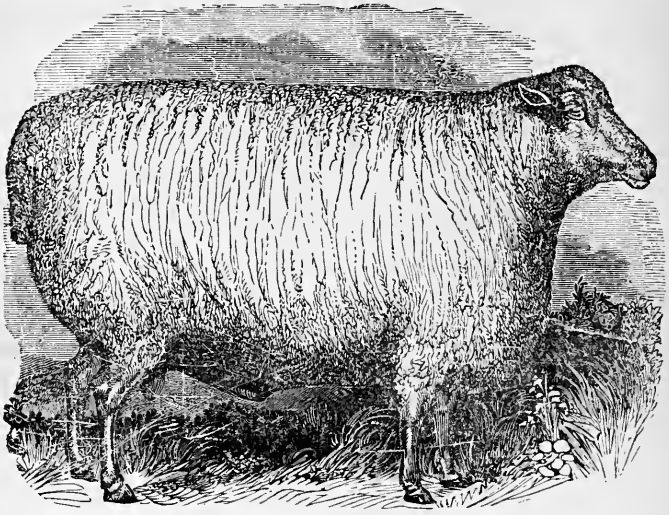
The New Leicester, is the most valuable of long-woolled sheep. As a lowland sheep, and destined to live on good pasture, the New Leicester is without a rival—in fact he has improved, if he has not given the principal value to all the other long-woolled sheep.

The head should be hornless; the eyes prominent, but with a quiet expression; the ears thin, long, and directed backward. The neck full and broad at its base, and gradually tapering to the head; the breast broad and full; the shoulders broad and round; the arm fleshy through its whole extent, and even down to the knee; the bones of the leg small, standing wide apart; no looseness of skin about them, and comparatively bare of wool. The quarters long and full; the thighs also wide and full. The legs of a moderate length; the pelt moderately thin, but soft and elastic, and covered with a good quantity of white wool, not so long as in some breeds, but considerably finer.

This account combines the main excellences of both Bakewell's own breed, and Culley's variety or improvement of it. It is precisely the form for a sheep provided with plenty of good food, and without any great distance to travel, or exertion to make in gathering it.

The principal recommendations of this breed, are its beauty and fulness of form, comprising in the same apparent dimensions, greater weight than any other sheep; an early maturity, and a propensity to

fatten, equalled by no other breed; a diminution in the proportion of offal, and the return of most money for the quantity of food consumed.



New Leicester Sheep.

It was about the middle of the last century, that Mr. Bakewell, of Dishley in Leicestershire first applied himself to the improvement of the sheep, in that county. Up to this time, very little attention had been given to the breeding of sheep.

Two objects alone appear to have engrossed the attention of the breeders; first, to breed animals of the largest possible size; and, secondly, such as should produce the heaviest fleeces. Aptitude to fatten, and symmetry of shape, that is, such shape as should increase as much as possible the most valuable parts of the animal, and diminish in the same proportion the offal, were entirely disregarded.

Mr. Bakewell perceived that smaller animals increased in weight more rapidly than those very large ones; and that they consumed so much less food, that the same quantity of herbage applied to feeding a larger number of small sheep, would produce more meat than when applied to feeding the smaller number of large sheep which alone it would support. He also perceived that sheep carrying a heavy fleece of wool possessed less propensity to fatten, than those which carried one of a more moderate weight.

Acting upon these observations, he selected from the different flocks in his neighborhood, without regard to size, the sheep which appeared to him to have the greatest propensity to fatten, and whose shape possessed the peculiarities which he considered would produce the largest proportion of valuable meat, and the smallest quantity of bone and offal.

In doing this, it is probable that he was led to prefer the smaller

sheep, still more than he had been by the considerations above stated, because it is found, that perfection of shape more frequently accompanies a moderate-sized animal than a very large one.

He also was of opinion that the first object to be attended to in breeding sheep, was the value of the carcass, and that the fleece ought always to be a secondary consideration. The reason for this is obvious: the addition of two or three pounds of wool to the weight of a sheep's fleece, is a difference of great amount; but if to procure this increase, a sacrifice is made of the propensity to fatten, the farmer may lose by it ten or twelve pounds of mutton.

The sort of sheep, therefore, which Mr. Bakewell selected, were those possessed of the most perfect symmetry, with the greatest aptitude to fatten, and rather smaller in size than the sheep then generally bred. Having formed his stock from sheep so selected, he carefully attended to the peculiarities of the individuals from which he bred, and, it appears, did not object to breeding from near relations, when, by so doing, he put together animals likely to produce a progeny possessing the characteristics that he wished to obtain.

Mr. Bakewell has been supposed, by some persons, to have formed the New Leicester variety, by crossing different sorts of sheep; but there does not appear to be any reason for believing this: and the circumstance of the New Leicesters varying in their appearance and qualities so much as they do from the other varieties of long-woolled sheep, can by no means be considered as proving that such was the system which he adopted. Every one who has attended to the breeding of domestic animals must have experienced that, by careful selection of those from which he breeds, and with a clear and defined conception of the object he intends to effect, he may procure a progeny in which that object will be accomplished.

At the present time, in the New Leicester breed of sheep, a practical proof of this may be seen in the flocks of Mr. Buckley and Mr. Burgess. Both of these flocks have been purely bred from the original stock of Mr. Bakewell, for upward of fifty years. There is not a suspicion existing in the mind of any one at all acquainted with the subject, that the owner of either of them has deviated in any one instance from the pure blood of Mr. Bakewell's flock; and yet the difference between the sheep possessed by these two gentlemen is so great, that they have the appearance of being quite different varieties. This difference, however, has only been produced by their respective owners having pursued with perseverance a different system; one of them having aimed at attaining merits of one description, and the other having aimed at attaining merits of a different nature.

This being the case, and there not existing any well-authenticated facts, or, indeed, any facts resting upon any authority whatever, to prove that the New Leicester breed of sheep was produced by Mr. Bakewell by crossing different sorts, it is highly probable that it was improved to its present state of perfection simply by selection from the then-existing breed of long-woolled sheep.

Having thus established his flock, Mr. Bakewell adopted a prac-

tice, which has since been constantly followed by the most eminent breeders of sheep; this was to let rams for the season, instead of selling them to those who wished for their use. This is an improvement of great value, beneficial alike to the proprietor of the ram, and to the person who hires him. It enables the ram-breeder to keep a much larger number of rams in his possession, and, consequently, greatly increases his power of selecting those most suitable to his flock, or which may be required to correct any faults in shape or quality that may occur in it; it also enables him, by cautiously using a ram for one season, or by observing the produce of a ram let to some other breeder, to ascertain, by actual observation of the produce, the probable qualities of the lambs which such ram will get, and thus saves him from the danger of making mistakes which would deteriorate the value of his stock. This system is equally beneficial to the farmers who hire the rams: it gives them the opportunity of varying the rams from which they breed much more than they otherwise could do; and it also gives them the power of selecting from sheep of the best quality, and from those best calculated to effect the greatest improvement in their flocks.

The effect of this system has been to introduce a sort of division of labor into the breeding of sheep: some flock-masters applying themselves almost exclusively to the rearing of rams for the purpose of letting them, and finding it, therefore, their interest to apply a more minute attention to improving the valuable qualities of their sheep than the time or other opportunities of an ordinary farmer could permit him to do; while the ordinary farmer gains the advantage of this attention paid by others, and is tolerably sure of always procuring a ram which, without such minute attention on his part, will keep his flock in a profitable and improving state. It is said that when Mr. Bakewell first determined to adopt this practice, the idea was so novel that he had great difficulty in inducing the farmers to act upon it, and that the first sheep he let was let for sixteen shillings. Since then a sheep has been let for the season at a thousand guineas, and many others for prices approaching that sum.

Such is the origin of the New Leicester breed of sheep, which have, within little more than half a century, spread themselves from their native county over every part of the United Kingdom, and are now exported in great numbers to the continents of Europe and America. Such, indeed, have proved to be their merits, that at the present day there are very few flocks of long-woolled sheep existing in England, Scotland, or Ireland, which are not in some degree descended from the flock of Mr. Bakewell. A pure Lincoln or Teeswater flock is very rarely to be found; and although some flocks of the pure Cotswold breed remain, in the greatest number of instances it is probable that they have been crossed with the New Leicesters.

No other sort of sheep possesses so great a propensity to fatten—no other sort of sheep is fit for the butcher at so early an age—and although they are not calculated for the poorest soils, where the herbage is so scanty that the sheep must walk over a great deal of

ground for the purpose of procuring its food, no other sort of sheep, in soils of a moderate or superior quality, is so profitable to the breeder.

They vary very much in size, weighing, at a year and a half old, with ordinary keep, from 24 to 36 lbs. per quarter. In this respect, therefore, they are inferior to the Lincoln, the Cotswold, and the Teeswater sheep. By crossing them with either of these sorts, the size of the sheep may be considerably increased; and it is said that this may be done without diminishing perceptibly either their inclination to become fat, or the early maturity for which they have always been remarkable. It would, however, be very unfortunate if the temptation which this increase of bulk holds out to the breeders, was to have a tendency to diminish the stocks of pure-bred New Leicesters at present existing, because there can be little doubt that it will be always essential to the preservation of the peculiar merits of this sort of sheep that the breeders may be able to have recourse to pure-bred rams.

The preference which Mr. Bakewell was inclined to give to a smaller race of sheep than the ordinary long-woolled sheep were at the time he commenced his improvements, and the decision he came to of attending more to the carcass than the fleece of the sheep from which he bred, undoubtedly led some of his immediate followers into considerable mistakes. They seem even to have imagined that want of size was a merit of itself, and instead of looking to the fleece of the sheep as a secondary consideration only, neglected it entirely, or even preferred sheep with bad fleeces to those with good ones. At present, however, these mistakes are corrected, and the principal breeders of the New Leicester sheep give their due and sufficient weight to all the qualities which are likely to produce a profitable animal.

We have said above, that the principles on which Mr. Bakewell acted have been of essential benefit to all the different breeds of our domestic animals. The great improvement which he made in the breed of sheep proved how important it is to a breeder of animals to attend to the peculiarities which distinguish the parents, and so to put the males and females together as to remedy any defects which may exist in either. Previous to the time of Mr. Bakewell, the importance of this care had not been understood; but the attention of breeders having been then called to it, the reasonableness of the principle was apparent, and it has since been attended to, more or less, by all those who have been anxious to improve their stock.

The result of the diffusion of the New Leicester sheep through every part of the United Kingdom is, that both friends and foes have been enabled to put fairly to the test their supposed excellences and defects; and there seems now to be a common agreement of opinion, if not precisely between these two opposite classes, yet between all impartial judges. The New Leicester, on good keep, will yield a greater quantity of meat, for the same quantity of food, than any other breed of sheep can do. This is their fundamental character and excellence. On moderate keep they will do as well as most

breeds: but they can not travel far for their food, nor can they bear, so well as many others, occasional scantiness or deprivation of nourishment. These properties plainly mark out for them the situation in which they should be placed, and the purposes for which they should be bred.

The kind of meat which they yield is of a peculiar character. When the sheep are not over-fattened, it is tender and juicy, but, in the opinion of many persons, somewhat insipid. When they are raised to their highest state of condition, the muscles seem to be partially absorbed; at least much fatty matter is introduced between their fibres. The line of distinction between the fat and the lean is in a manner lost, and, with the exception of a few joints, and a small part of them, the carcass has the appearance and the taste of a mass of luscious fat. There is the same difference between the over-fat Leicester and South-Down, which there is between the Short-horn and the Kyloe, when forced into an unnatural state of condition. This, however, is no solid objection to the breed. It marks the point, easily attained, to which the fattening process should be carried, and where it should stop. It marks the character of the animal, and the profit which may be derived from it, and it is the fault of the grazier if he converts an excellence into a nuisance.

It is to be doubted whether this disposition to over-fatness remains to as great an extent as it did in the early existence of the New Leicesters. Whether it arises from the fashionable but injurious system of many of the cultivators of these sheep, or from some gradual impairment of the constitution of the breed, there can be no doubt that the size of the New Leicesters has materially diminished. Occupying the same farm, and the cultivation of that farm being the same, the management unchanged, and the sale taking place at the same time of the year, there is an evident diminution of both live and dead weight. This, perhaps, may be chiefly owing to the continued application of that principle which did credit to the judgment of Bakewell when he was surrounded by large and coarse animals only, namely, to look to symmetry alone, and to trust to chance or to nature for the size and weight; but which must have an injurious tendency when the characteristic of the breed is neatness and beauty of form. The heaviest pure New Leicester sheep, of which there is any authentic account, belonged to Mr. Morgan, of Loughton: its live weight was 368lbs., and the weight of the carcass 248lbs. It was killed in April, and had been with the ewes until November the 1st. The heaviest of Mr. Painter of Burghley's pen of 32 months' old Leicester wethers, exhibited at the Smithfield cattle-show, in 1835, weighed but 165lbs.; the two others were 155lbs. and 143lbs. The three South-Downs, of the same age, exhibited by Mr. Stephen Grantham, of Stoneham, weighed 168lbs., 165lbs., and 163lbs.

The Leicester sheep were never favorites with the butcher, because they had little loose inside fat. It has been well said that "tallow is a kind of boon which, if not forthcoming, produces a disappointment that the butcher can not brook." It ought, nevertheless, to have been recollected that the smallness of the head, and the thinness of the

pelt, would in some measure counterbalance the loss of tallow: that there is that about the Leicester sheep which would fully make amends to the butcher for the diminution of offal, namely, the property of weighing considerably more than the appearance of the animal would indicate; and that this very diminution of the offal, whatever the butcher may think of it, is advantageous to the grazier, for it shows a disposition to form fat outwardly, and is uniformly accompanied by a tendency to quickness of improvement.

It must also be conceded that the New Leicester sheep has a smaller quantity of bone in proportion to its weight than is to be found in any other breed, a circumstance highly advantageous to the consumer, although, in more ways than one, it may not be so profitable to the butcher.

There is another good quality in the New Leicesters of essential importance, namely, their early maturity. They are sooner prepared for the butcher than any other description of sheep, and the pasture left ready for other purposes. This was undeniably the case when they were first introduced. It was a point which, for many years afterward, their most prejudiced enemies could not deny. Mr. Price, in his "Treatise on Sheep," gives a satisfactory illustration of this: "In the spring of 1806, I called upon the earl of Thanet, in Kent, in order to view his breed of sheep: his lordship is for giving every breed a candid trial. He then had the New Leicesters, the South-Down, and the Romney Marsh breeds, together. He informed me that the New Leicester breed suited his purpose far better than any of the others, for they were ripe for the slaughter-house in April; whereas, the South-Down and the Kents would not be so until the latter end of the summer. The advantage which he received was that of making two returns on his pastures."

Great improvement has been effected in the system of sheep-husbandry since that time, and other breeds of sheep have materially advanced. Between some of them and the Leicesters it would occasionally be a neck-and-neck race, or the old favorites might now and then be left behind; but, as a general rule, and all circumstances being equal, the New Leicester sheep will get the start of their competitors; and they will not be left behind, although dearer and more stimulating food than used to be allowed is given to their rivals.

The New Leicesters, however, are not without their faults. They are not, even at the present day, so prolific as most other breeds. This was too much overlooked in the time of Bakewell and his immediate followers. Their object was to produce a lamb that could be forced on so as to be ready, at the earliest possible period, for the purposes of breeding or of slaughter, and therefore the production of twins was not only unsought after, but was regarded as an evil. It was considered that, during the period of gestation, few ewes would be able to bring to their full fœtal growth two such lambs as the Leicestershire breeders desired to have. The fact also which, if they had seriously thought of the matter, must have appeared to be unavoidable, too soon began to be evident, viz., that when the energies of the system were systematically directed to one point—the

accumulation of flesh and fat as early and to as great an extent as possible—there must be a deficiency in some other point; and the Leicester tups were not such sure lamb-getters, and the ewes were not so well disposed for impregnation, and the secretion of milk was not so abundant as in other breeds. When, however, the contest for the highest character as a tup-breeder, and the highest price for the letting of the tups, was somewhat passed over, and the Leicesters were submitted to the usual routine of sheep-husbandry, they became better breeders and better nurses.

It was likewise, and not without reason, objected to them that their lambs were tender and weakly, and unable to bear the occasional inclemency of the weather at the lambing season. This also was a necessary consequence of that delicacy of form, and delicacy of constitution too, which were so sedulously cultivated in the Leicester sheep. The circumstance of their indisposition to accumulate fat internally was, however, much in their favor here. Had they "died as well," or, in plainer language, contained as much fat within as their external appearance bespoke, there would have been no room for the growth of the little one, and its puny form could not have endured the slightest hardship.

The last objection to the New Leicester sheep was the neglect and deficiency of the fleece; but this has been already hinted at. It was a great objection in the early history of the improved breed. The weight and quality of the fleece were not merely, as they should be, somewhat secondary considerations, but they were comparatively disregarded. There is little cause, however, for complaint at the present period. The wool has considerably increased in length, and has improved both in fineness and strength of fibre; it averages from six to seven pounds the fleece, and the fibre varies from five to more than twelve inches in length. It is mostly used in the manufacture of serges and carpets.

The principal value of the New Leicester breed consists in the improvement which it has effected in almost every variety of sheep that it has crossed. A rapid glance at the districts that have passed in review will afford satisfactory proof of this, as it regards the short-woolled breed. The Leicesters had nothing to do with the original formation of any of them, for each grew out of the situation in which it was placed: but they have formed useful and improved varieties with most of them, and in various instances a cross with them has superseded the native breed.

They had nothing to do with the formation of the South-Downs, and the early crosses with them were not successful. The activity and the hardihood of the Sussex sheep were to a certain degree impaired, and the wool was lengthened, weakened, and could no longer be used in the manufacture of cloth: but, when a complete revolution had taken place in the character and uses of the British short wools —when a finer and a better wool than the South-Downs ever produced was brought into the market, and rapidly superseded that of British growth—when, in point of fact, the South-Down wool was driven from all its old markets, and had to seek new and perfectly

different ones—many farmers, reluctantly and hesitatingly at first, began to cross the South-Down ewe with the Leicester ram. The consequence of this was, that although the South-Downs lost some hardihood, as it regarded both keep and weather, they obtained a carcass not materially diminished in value in the estimation of either the consumer or the butcher—coming somewhat earlier to the market, and yielding a fleece longer in its staple, finer in its fibre, with much of its former strength, and feltiness too, and nearly doubled in weight—a true combing wool, valued by the manufacturer, having ready sale, and producing a fair remunerating price.

Crosses between the New Leicester and the Dorset sheep have not been attempted on any extensive scale; but now that the middle wool finds so easy and profitable a market, the experiment will doubtless be resumed.

Still farther in the west the Leicesters have been eminently useful. Both the Dartmoor and the Exmoor sheep owe much to them, with respect to earlier maturity, increased size so far as it is desirable, and a far more valuable fleece.

Sir John Sinclair has recorded his opinion on this point: "The Dishley breed is perhaps the best ever reared for a rich arable district; but the least tincture of this blood is destructive to the mountain sheep, as it makes them incapable of standing the least scarcity of food." Experience, however, has proved that both the highland and the upland sheep may be much improved by admixture with lowland blood; they may obtain the faculty of turning every particle of food to nutriment, and the early maturity, which constitute the value of the Leicester breed.

The breed itself can not be changed. "I occupied a farm," says a Lammermuir sheep-master, "that had been rented by our family for nearly half a century. On entering it, the Cheviot stock was the object of our choice, and so long as we continued in possession of this breed everything proceeded with considerable success; but the Dishley sheep came into fashion, and we, influenced by the general mania, cleared our farm of the Cheviots and procured the favorite stock. Our coarse, lean pastures, however, were unequal to the task of supporting such heavy-bodied sheep; and they gradually dwindled away into less and less bulk: each generation was inferior to the preceding one; and when the spring was severe, seldom more than two thirds of the lambs could survive the ravages of the storm." This was a sufficient illustration of the folly of placing certain breeds of sheep on situations which nature had not formed them to occupy; but it is another question whether there are not certain qualities belonging to sheep occupying a very different locality that may be advantageously imparted to other breeds.

MANAGEMENT OF THE LEICESTER SHEEP

The Leicester ewes, although they do not bring so many lambs, nor rear them so certainly, nor make them so fat as sheep of a more hardy description do, yet have very much improved in these respects, and actually rear from a hundred and ten to a hundred and twenty

lambs from every one hundred ewes; the ewes that are barren being mostly fit for the butcher, and those that lose their lambs getting fat in much less time than any other breed. On account of this promptitude to fatten, the Leicesters are brought into the market, and average as much per quarter at one year old, as those of most other breeds do at two and three; the farmer also having the power to stock harder and closer with them than with any others of equal weight, as they are always in good condition, even when suckling lambs, or hard kept. The ewes will not fatten their lambs for the butcher; but this is no eventual loss to the farmer, as lambs of this breed are much better kept on for mutton and wool, and it would be a public detriment to slaughter them prematurely.

Some farmers, however, finding a great and steady demand for lamb as well as for mutton, have been induced to keep an annual stock of sheep, consisting only of ewes and wethers bought in at Michaelmas, principally of the Cheviot and Anglesey breeds. The ewes are immediately put to a Leicestershire ram. The lambs are fattened and sold in June or July, and the ewes are afterward fed on clover-grass, and sold in October or November. The Cheviots are good sucklers, and generally make fat lambs, averaging about 15lbs. the quarter, while from 3 to 4 lbs. of wool are cut from each.

The wethers are of the same kind, and are bought about May or June, from one to four years old. They are fed on clover or grass, and mostly sold in the autumn, averaging about 16lbs. the quarter, and yielding from $3\frac{1}{2}$ to $4\frac{1}{2}$ lbs. of wool. Sometimes they are kept on until the following spring, and fed upon turnips; but being of a restless disposition, they seldom increase more in weight than from 2 to 3 lbs. per quarter from October to March.

The Leicester ewes are put to the ram at the beginning or middle of October, and taken from him again about the second week in November. One ram will serve from 60 to 70 ewes: but if he is kept in a close, and a teaser employed, he will serve from 80 to 100. He is raddled at the time that he is put to the ewes, and those which are served are taken from him once a week and numbered. They are then put to another ram that has been blackened, in order to distinguish the ewes that are served again. These are likewise drawn every week and marked with a different number. This precaution will save much trouble when they are drawn for lambing, which ought always to be done.

The ewes will approach their time of yeaning about the beginning or middle of March; and this being often an inclement season, and the Leicesters requiring more attention than the hardier kind of sheep, the ewes that are coming to the last week of pregnancy should be separated from the others according to their numbers, and brought nearer home, that they may be put into a yard at night, constructed for this purpose, having a good shed in it, and being well protected from the cold wind. They should have a plentiful supply of turnips, ox-cabbage, &c. The greatest attention should be paid to them at this time, and the shepherd should be with them as much as his other duties will permit. If it is a peculiarly-valuable flock, the

shepherd should sleep on the premises, for the Leicester ewes are more liable to require assistance when yeaning than any other sheep are. The lambs are generally large, and the ewes very fat, and so a double difficulty occurs.

The lambs are kept up for a few nights, leaving them out with the mothers in the daytime. They should be castrated when about a fortnight old; but a fine and dry day should be selected, and they should be kept up for two or three nights afterward. They should likewise be tailed at the same time. The lambs remain with their mothers until the beginning or middle of July; they are then weaned and turned into good pasture of seeds or grass, until the latter end of October, when they are put upon turnips—sometimes the common turnips first, and afterward the Swedes; but they do better upon turf, provided it is to be had—a few turnips being drawn when the weather is severe. The ewes remain on the ordinary pasture, which probably will bear from seven to eight per acre, until within three weeks of their being put to the ram, when they should be changed into good pasture, which will cause them to flower sooner and more regularly. The ewes continue on the old pastures until the end of November, from the time the rams are taken away, when they are sometimes hurdled upon turnips, the fat sheep having been penned upon them first, and the ewes following to make clean work.

The lambs are seldom shorn until the second year, when the fleece will weigh between 7 and 8 lbs., the length of the staple being from ten to twelve inches. The aged ewes yield from $5\frac{1}{2}$ to 6 lbs. of wool. The usual time of shearing the store sheep is from the beginning to the middle or end of June; sometimes, however, they are shorn in May, and yield from 7 to 9 lbs. of wool. The washing usually takes place in the last week in May; after which the sheep are sent into clean pastures for a week or a fortnight before they are shorn. Some farmers permit a longer time to elapse in order to allow the yolk to rise into the wool; this makes it weigh heavier, and also work better in the manufacturing process. The yearling wethers are generally separated from the theaves at the time of shearing, and they are put upon good keep, and most frequently upon seeds. The theaves run upon the common pasture until the ewes go to better keep, previous to their being sent to the ram. The wethers are generally kept on turnips, and sold in the early part of the following spring. On large and well-conducted farms they have a rack in the field, well supplied with coarse hay or straw, and a trough is fixed under the rack, containing common or rock salt. The system of folding is rarely adopted where the New Leicester sheep are kept: neither the nature of the sheep nor the size of the farms will often allow it.

No apology is made for the insertion of this simple, intelligible, and complete system of long-woolled sheep-husbandry: it should, however, be stated, that it more accurately describes the course pursued by the large than the small farmer.

CHAPTER V.

Middle-Woolled Sheep.—The South-Downs.—The Spanish Sheep.—The Merino Breed.

By the term middle-wools are meant the South-Down, Norfolk, Dorset, Cheviot, and other fleeces which occupy an intermediate place between the short wools of Spain and Germany and the long of Leicester and Lincoln.

The South-Downs are a long range of chalky hills, diverging from the great chalky stratum which intersects the kingdom from Norfolk to Dorchester. They enter the county of Sussex on the west side, and are continued almost in a direct line as far as East Bourne, where they reach the sea. They may be considered as occupying a space of more than sixty miles in length, and about five or six in breadth, consisting of a succession of open downs, with few enclosures, and distinguished by their situation and name from a more northern tract of similar elevation and soil, passing through Surrey and Kent, and terminating in the cliffs of Dover, and of the Forelands. On these downs a certain breed of sheep has been cultivated for many centuries, in greater perfection than elsewhere; and hence have sprung those successive colonies, which have found their way to every part of the kingdom, and materially benefited the breed of short-woolled sheep wherever they have gone.

THE SOUTH-DOWNS.

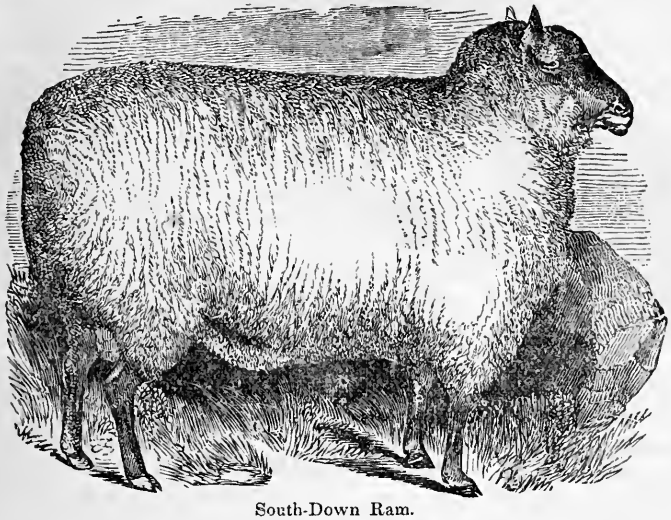
It is only lately, however, that they have been brought to that degree of perfection which they at present exhibit. Their zealous advocate, and the breeder to whom they are indebted more than to any other for the estimation in which they are now justly held, Mr. Ellman, says of them: "This breed was formerly of a small size, and far from possessing a good shape, being long and thin in the neck, high on the shoulders, low behind, high on the loins, down on the rumps, the tail set on very low, perpendicular from the hip-bones, sharp on the back—the ribs flat, not bowing, narrow in the fore-quarters, but good in the leg, although having big bones."

This breed is now much improved. "They are now," says Mr. Ellman, "much improved in both shape and constitution. They are smaller in bone, equally hardy, with a greater disposition to fatten, and much heavier in carcase when fat. They used seldom to fatten until they were four years old; but it would now be a rare sight to see a pen of South-Down wethers at market more than two years old, and many are killed before they reach that age."

This animal has a patience of occasional short keep, and an endurance of hard stocking scarcely surpassed by any other sheep, an early maturity not inferior to that of the Leicesters, the flesh finely grained, and the wool of the most useful quality.

The South-Down sheep are polled; but it is probable that the original breed was horned. It has been shown that the primitive breed of sheep was probably horned. The ram that was sacrificed

by Abraham, instead of his son, was entangled in a thicket by his horns; and it is not unusual to find among the male South-Down lambs some with small horns.



South-Down Ram.

The dusky or sometimes black hue of the head and legs of the South-Downs, not only proves the original color of the sheep, and perhaps of all sheep, but the later period at which it was seriously attempted to get rid of this dingy hue proving unsuccessful, only confirms this view. Many of the lambs have been dropped entirely black.

Green rye is the food most in use in the beginning of spring. Rye-grass succeeds to the rye, and affords excellent food until the latter end of June, when the winter tares will follow. These, according to Mr. Ellman, may be sown from the beginning of October to the beginning of the May following; so that one crop may follow the other as it may be wanted.

Tares, clover, or rape, come next in order. The tares are probably not so good as the clover or rape; but this depends much on the situation and soil of the farm. Lastly, for winter-food, come the turnips, of which the sheep-owner should be careful always to have a sufficient quantity. The Swedes are preferable, if they can be sown sufficiently early, and will last until the lambing-time; but they should not be given afterward, for the lambs do not always thrive upon them.

There are no sheep more healthy than the South-Downs. They seldom suffer from the hydatid on the brain, nor, on the majority of the farms, are they so much exposed to the rot as in many other districts. Their general health may be much connected with this frequent change of food, and their periodical journeys to and from the fold.

The rams are usually put with the ewes about the middle of October, and remain with them three or four weeks. The careful breeder, where his farm will admit of it, puts only one ram to a certain number of ewes in each enclosure—about forty to a lamb-ram, and eighty to one fully grown. He thus knows the progeny of each ram—a circumstance of no little importance with regard to the improvement of the breed. At the end of the third or fourth week, the whole flock is again put together; two or three rams being left with them in case any of the ewes should still remain at heat.

It is believed that the treatment of the ewes at this time has considerable connexion with the number of lambs which they will produce. If they are well kept, a considerable proportion of them will probably have twins. It is possible that the stimulus of plentiful and nutritious food may have some influence on the number of the lambs; but if the farming arrangements of the sheep-breeder should render it desirable for his stock thus rapidly to multiply, he would be most likely to accomplish his object by breeding from rams and ewes that were twins. No fact can be more clearly established than an hereditary tendency to fecundity.

The Sussex farmers usually set an example of humanity to those in many other districts, in the care which they take of the ewe at the time of yeaning. She is driven home, or there are sheds or sheltered places for her constructed in the field, and the loss, as it regards the mother or the lamb, is comparatively light; while the owner has the satisfactory reflection that these valuable animals have not been cruelly abandoned at a time of suffering and danger.

The stock of the Sussex sheep-breeder does not often contain many wethers. The wether-lambs, if not sent to the Weald, are usually sold when about six months old, and the ewes are always disposed of at four or five years old, and before they have begun to lose their teeth. Very large lambs are certainly often procured from old ewes, but they do not fatten so well as those that are yeaned by younger sheep. The average price of the lambs is from 12*s*. to 15*s*., and of the draught-ewes from 18*s*. to 24*s*. The wethers that are kept have a greater quantity of grass, and fewer turnips, than is the practice with most other breeds; but the greater part of them, and sometimes the whole number, are sent to the small farmers in the Weald, in order to be kept during the winter. The number of South-Down sheep sent for the supply of the London market, has for many years past been regularly increasing; and while the quality of the flesh pleases the customer, they are generally admitted to be the best *proof* sheep that are brought to Smithfield.

The average dead-weight of the South-Down wether varies from 110 to 150 lbs.; but Mr. Grantham exhibited a pen of three sheep in the last show of the Smithfield Club (1835), one of them weighing 283lbs.; a second, 286lbs.; and the third, 294lbs.

The average weight of the fleece of a South-Down hill sheep was stated by Mr. Luccock, in 1800, to be 2lbs.; it has now increased to 3lbs. The fleece of the lowland sheep, that used to be 3lbs., is now 3½, or even 4 lbs. This is the natural consequence of the dif

ferent mode of feeding, and the larger size of the animal. The length of the staple in the hill sheep rarely exceeded 2 inches, and was oftener not more than $1\frac{1}{2}$ inches: it is now more than 2 inches, and in some of the lowland sheep it has reached to 4 inches. The number of hill sheep had rather decreased since 1800, and those in the lowlands had materially so; but now that South-Down wool is once more obtaining a remunerating price, the flocks are becoming larger than they were. The color of the wool differs materially, according to the color of the soil. The shortest and the finest wool is produced on the chalky soil, where the sheep have to travel far for their food; but there is a hardness and a brittleness about this wool which was always seriously objected to.

The greater comparative bulk of the fibre, and paucity of serrations, will account for the harshness and want of felting property, which have been considered as defects in this wool. The brittleness of the pile is, perhaps, to be attributed chiefly to the soil. The clothiers were always careful not to use too much of it in the making of their finest cloths. When most in repute, the South-Down was principally devoted to the manufacture of servants' and army clothing, or it was sparingly mixed with other wools for finer cloth. Now, however, when it is materially increased in length, and become a combing wool, and applicable to so many more purposes than it was before—now that it enters into the composition of flannels, baizes, and worsted goods of almost every description—its fineness and its felting, compared with some of the other short wools, render it a truly valuable article. The South-Down sheep-master justly repudiates the charge of its deterioration—*it has only changed its character*—it has become a good combing wool, instead of an inferior carding one; it has become more extensively useful, and therefore more valuable; and the time is not far distant when the sheep-owner will be convinced that it is his interest to make the South-Down wool even longer and heavier than it now is.

One species of South-Down wool has decidedly improved—the hogget wool, or that which is left on the sheep untouched until the second shearing-time. This was always used as a combing wool; and its increased length, since the present system of sheep management has been adopted, adds materially to its value. It is finer than the long wools—it has more feltiness about it, and it is applicable to more numerous and profitable purposes.

The practice of letting and selling rams was more prevalent and more profitable among the breeders of the South-Down sheep than of any other kind, except the Leicesters. At the sheep-shearing at Woburn, in 1800, a South-Down ram, belonging to the duke of Bedford, was let for one season at 80 guineas, two others at 40 guineas each, and four more at 28 guineas each. This practice has been, of later years, pursued extensively and profitably by Messrs. Ellman, Grantham, Todd, and others.

Two years previously to this, the Emperor of Russia bought two of Mr. Ellman's rams, in order to try the effect of the cross on the northern sheep. The duke of Bedford, at the request of Mr. Ell-

man, put a price upon them, observing that he did not wish to charge a foreign sovereign, who had done him so much honor, more than any other individual. The price fixed by the duke was 300 guineas for the two, and he purchased two more for himself at the same rate.

The pure South-Downs have penetrated to almost every part of the kingdom; and everywhere they have succeeded, when care was taken that the locality and the soil were suited to the breed: except that on the northern hills, where the Cheviots and the black-faced sheep wander, they have not thriven so well as on their native downs.

On the south coast, and the adjacent inland counties, the sheep seem to have one common origin with the South-Downs, or evidently owe almost all that is good about them to the influence of this valuable breed. The best black-faced sheep of Hampshire are a cross between the old black-faced Berkshire and the pure South-Down. The modern Berkshire owes his best qualities to the same source; and the Wiltshire is become but a variety of the South-Down. Crosses between the South-Down and the Norfolk breeds are much valued in Norfolk, Suffolk, and Cambridge; and in Norfolk, as well as in Dorset, the South-Downs are contending, and successfully, with the pure breeds of those counties on their own ground, and promising, at no very distant time, either quite to supersede them, or materially diminish their range. A contest that will be attended by a similar result, is carrying on between them and the Cotswolds and the Rylands, in some parts of Gloucester and Hereford.

They have reached, and they have established themselves, in Ireland. The first experiment was made in the county of Wicklow, under the direction of the Farming society of Ireland, and they improved, and in process of time almost banished, the native breed. Thence they spread in greater or less numbers, and where the locality suited, to almost every part of the sister island.

The old sheep of the Weald of Sussex (a few of which are still found in many parts of it, feeding on the commons in summer, and the stubbles and ley-grounds in winter) are small, ill-formed, slow to fatten, and with comparatively coarse wool. They betray, however, considerable affinity to the South-Downs, and were probably the native sheep of the hills, either not improved, or degenerated in size, and form, and wool. The Weald farmers do not often keep many sheep of their own, but depend on the Down flocks to consume their winter food. The wool of the Weald sheep used to resemble that of the underhill South-Downs, being longer, coarser, and yet softer, than that of the more upland sheep.

In Western Sussex, where the land is considered too good and wet to keep breeding flocks, a heavier sort of sheep is found, which seem to have been a cross of the Somersets and the Downs, and are purchased by the farmers in the autumn, at the fairs in the west of England.

In many parts of Sussex, the Somersets and Dorsets are much used for early lambs. Pampered on the richest keep, the period of œstrum is considerably hastened: the lambs are dropped in Jan

nary, and sometimes in December, and are ready for the London market on or before Easter. The Down lambs also fatten kindly, and come to the market in June and July, being then much more delicate than the earlier horned lambs.

THE SPANISH SHEEP.

The Spanish sheep, in different countries has, either directly or indirectly, effected a complete revolution in the character of the fleece.

The early writers on agriculture and the veterinary art, describe various breeds of sheep, as existing in Spain: they were of different colors—black, and red, and tawny. The black sheep yielded a fine fleece—the finest of that color, which was then known; but the red fleece of Bætica—Granada, and Andalusia—was of still superior quality, and "had no fellow."

These sheep were probably imported from Italy. They were the Tarentine breed, already described, and which had gradually spread from the coast of Syria, and the Black sea, and had now reached the western extremity of Europe. Many of them mingled with and improved the native breeds of Spain, while others continued to exist as a distinct race; and, meeting with a climate and a herbage suited to them, retained their original character and value, and were the progenitors of the Merinoes of the present day. Columella, a colonist from Italy, and uncle to the writer of an excellent work on agriculture, resided in Bætica, in the reign of the Emperor Claudius (A. D. 41). He introduced more of the Tarentine sheep into Spain, and he otherwise improved on the native breed; for, struck with the beauty of some African rams, which were brought to Rome to be exhibited at the public games, he purchased them, and conveyed them to his farm in Spain. Hence, probably, the better varieties of the *Chunah*, or long-woolled breeds of Spain, that will presently come under consideration.

Previous, however, to the time of Columella, Spain possessed a valuable breed of sheep; for Strabo, who flourished under Tiberius, speaking of the beautiful woollen cloths that were worn by the Romans, says that the wool was brought from Truditania, in Spain.

With regard to the extent of these improvements history is silent; but as Spain was at that time highly civilized, and as agriculture was the favorite pursuit of the greater part of the colonists that spread over the vast territory, which then owned the Roman power, it is highly probable, that the experiments of Columella, laid the foundation for a general improvement in the Spanish sheep—an improvement which was not lost, nor even materially impaired, during the darker ages that succeeded.

The original Spanish sheep were, according to Pliny, Solinus, and Columella, some black-fleeced; some produced red or Erythræan wool; and some, as those about Cordova, had a tawny fleece. The remains of these ancient varieties of color, may still be discerned in the modern Merino sheep. The plain and indeed the only reason that can be assigned for the union of black and gray faces, with white bodies in the same breed, is the frequent intermixture of black

and white sheep, until the white prevails in the fleece, and the black is confined to the face and legs. It is still apt to break out occasionally in the individual, unless it is fixed, and concentrated in the face and legs, by repeated crosses and a careful selection; and, on the contrary, in the Merino South-Down the black may be reduced by a few crosses to small spots about the legs, while the Merino hue overspreads the countenance. The Merino hue, so variously described as a velvet, a buff, a fawn, or a satin-colored countenance, but in which a red tinge not unfrequently predominates, still indicates the original colors of the indigenous breeds of Spain; and the black wool, for which Spain was formerly so much distinguished, is still apt to break out occasionally in the legs and ears of the Merino race. In some flocks, half the ear is invariably brown, and a coarse black hair is often discernible in the finest pile.

In the eighth century the Saracens established themselves in Spain, and they found it fruitful in corn, and pleasant in fruits, and "glutted with herds and flocks." The luxury of the Moorish sovereigns, has been the theme of many a writer, and a rich and expensive dress has always been one of the leading articles of luxury: accordingly in the thirteenth century, when the woollen manufacture was scarcely known in a great part of Europe, and in few places flourished, there were found in Seville no less than 16,000 looms. At the same period, the cloths of Lerida were much esteemed. A century afterward, Barcelona, and Perpignan, and Tortosa, were celebrated for the fineness of their cloths, and the greater part of Europe, as well as the coast of Africa, was supplied with them; and, later than this, and in the time of Charles V., Spain was full of flocks and herds, and not only furnished its own people most abundantly, but also foreign nations, with the softest wool. In 1576, there were annually exported from Spain to Bruges alone, 40,000 sacks of wool, each selling for at least 20 gold ducats ($45); and others, of a finer kind, were sent to Italy, at the price of 50 gold ducats ($112.50), per sack.

After the expulsion of the Saracens the woollen manufacture languished, and was in a manner lost, in Spain. Ferdinand V. banished nearly 100,000 industrious people, because they were Moors, and for this worthy deed was honored with the title of catholic. His successor, Philip III., drove from Valentia, more than 140,000 of the Mahometan inhabitants; and in the three following years 600,000 more were expelled from Murcia, Seville, and Granada. The majority of these people were artisans—weavers; and the natural consequence was, that the 16,000 looms of Seville dwindled down to sixty, and the woollen manufacture almost ceased to have existence throughout Spain.

The Spanish government at length saw, but too late, its fatal error, and many attempts have been since fruitlessly made to produce again the beautiful fabrics of former days. All this while, however, the Spanish sheep, seem to have withstood the baneful influence of almost total neglect. Until a few years ago, the Peninsula continued to possess the most valuable fine-woolled sheep; and will always have to boast that, although the Merino flocks and the Merino wool,

have improved under the more careful management of other countries, Europe and the world are originally indebted to Spain, for the most valuable material in the manufacture of cloth.

Pedro IV. of Spain imported, for the supposed improvement of the Spanish sheep, several Barbary rams; and that, two hundred years afterward, Cardinal Ximenes had recourse to African rams for the same purpose. Of the effect produced by these experiments, there is no authentic account. It is probable that the Barbary sheep, like the Cotswolds of England, were employed in improving the coarser and long-woolled breed of Spanish sheep; and that the shorter and finer woolled sheep, the breed whence the present race of Merinoes descended, were undebased by foreign admixture.

The perpetuation of the Merino sheep in all its purity, amidst the convulsions which changed the whole political existence of Spain, and destroyed every other national improvement, is a fact which the philosopher and the philanthropist may not be able fully to explain: but which he will contemplate with deep interest. In the mind of the agriculturist, it will beautifully illustrate the primary determining power of blood or breeding, and also the agency of soil and climate, a little too much underrated perhaps, in modern times.

The Spanish sheep are divided into the *estantes* or *stationary*, and the *transhumantes* or *migratory*. The stationary sheep are those that remain during the whole of the year on a certain farm, or in a certain district, there being a sufficient provision for them in winter and in summer. The transhumantes wander some hundreds of miles twice in the year, in search of pasture.

The principal breed of stationary sheep consists of true Merinoes, but the breeds most sought for, and with which so many countries have been enriched, are the Merinoes of the migratory description, which pass the summer in the mountains of the north and the winter on the plains toward the south of Spain.

The first impression made by the Merino sheep on one unacquainted with its value would be unfavorable. The wool lying closer and thicker over the body than in most other breeds of sheep, and being abundant in yolk, is covered with a dirty crust, often full of cracks. The legs are long, yet small in the bone; the breast and the back are narrow, and the sides somewhat flat; the fore-shoulders and bosoms are heavy, and too much of their weight is carried on the coarser parts. The horns of the male are comparatively large, curved, and with more or less of a spiral form; the head is large, but the forehead rather low. A few of the females are horned, but, generally speaking, they are without horns. Both male and female have a peculiar coarse and unsightly growth of hair on the forehead and cheeks, which the careful sheepmaster cuts away before the shearing-time; the other part of the face has a pleasing and characteristic velvet appearance. Under the throat there is a singular looseness of skin, which gives them a remarkable appearance of throatiness, or hollowness in the neck. The pile, when pressed upon, is hard and unyielding; it is so from the thickness with which it grows on the pelt, and the abundance of the yolk, retaining all the dirt and gravel which

falls upon it; but, when examined, the fibre exceeds in fineness, and in the number of serrations and curves, that which any other sheep in the world produces. The average weight of the fleece in Spain is eight pounds from the ram, and five from the ewe. The staple differs in length in different provinces. When fatted, these sheep will weigh from twelve to sixteen pounds per quarter.

Merino Ram.

The excellency of the Merinoes consists in the unexampled fineness and felting property of their wool, and in the weight of it yielded by each individual sheep; the closeness of that wool, and the luxuriance of the yolk, which enables them to support extremes of cold and wet quite as well as any other breed; the easiness with which they adapt themselves to every change of climate, and thrive and retain, with common care, all their fineness of wool, under a burning tropical sun, and in the frozen regions of the north; an appetite which renders them apparently satisfied with the coarsest food; a quietness and patience into whatever pasture they are turned, and a gentleness and tractableness not excelled in any other breed.

Their defects, partly attributable to the breed, but more to the improper mode of treatment to which they are occasionally subjected, are, their unthrifty and unprofitable form; a voraciousness of appetite which yields no adequate return of condition; a tendency to abortion or to barrenness; a difficulty of yeaning; a paucity of milk, and a too frequent neglect of their young. They are likewise said, notwithstanding the fineness of their wool and the beautiful red color of the skin when the fleece is parted, to be more subject to cutaneous affections than most other breeds. Man, however, has far more to do with this than Nature. Everything was sacrificed in Spain to fineness

and quantity of wool. These were supposed to be connected with equality of temperature, or at least with freedom from exposure to cold: and therefore twice in the year a journey of four hundred miles was undertaken, at the rate of eighty or a hundred miles per week and the spring journey commencing when the lambs were scarcely four months old. It is difficult to say in what way the wool of the migratory sheep was or could be benefited by these periodical journeys. It is true that among them is found the finest and the most valuable wool in Spain. The Leonese fleece will at all times sell for considerably more per found than that of any other Spanish sheep; but, on the other hand, the estantes of Segovia are more valuable than the transhumantes of Soria. Sir Joseph Banks goes further, for he says that "Burgoyne tells us that there are stationary flocks, both in Leon and Estremadura, which produce wool quite as good as that of the transhumantes." In addition to this is the now acknowledged fact that the fleece of some of the German Merinoes, who travel not at all, and are housed all the winter, as much exceeds that obtained from the Leonese sheep in fineness and felting property, as the Leonese fleece exceeds the Sorian; and the wool of the migratory sheep is comparatively driven out of the market by that from sheep which never travel. At all events, the advantages derived from the *Mesta* are overrated so far as the fleece is concerned; while, with respect to the carcass, by these harassing journeys, occupying one quarter of the year, the possibility of fattening and the tendency to fatten must be destroyed, and the form and the constitution of the flock deteriorated, and the lives of many sacrificed.

The migratory sheep may be divided into two classes, or immense flocks—the Leonese and the Sorians. The Leonese, among which are the Negrettes, after having been cantoned during the winter on the north bank of the Guadiana, in Estremadura, begin their march about the 15th of April in divisions of two or three thousands. They pass the Tagus at Almares, and direct their course toward Trecasas, Alfaro, and L'Epinar, where they are shorn. This operation having been performed, they recommence their travels toward the kingdom of Leon. Some halt on the Sierra (ridge of mountains) which separates Old from New Castile, but others pursue their route to the pastures of Cervera, near Aquilar del Campo. Here they graze until the end of September, when they commence their return to Estremadura.

The Sorian sheep, having passed the winter on the confines of Estremadura, Andalusia, and New Castile, begin their route about the same time. They pass the Tagus at Talavera, and approach Madrid; thence they proceed to Soria, where a portion of them are distributed over the neighboring mountains, while the others cross the Ebro in order to proceed to Navarre and the Pyrenees.

These periodical journeys can be traced back to the middle of the fourteenth century, when a tribunal was established for their regulation. It was called the *Mesta* (the derivation of this term is disputed), and consisted then, and continues to consist, of the chief proprietors of these migratory flocks. It established a right to graze on all the open and common land that lay in the way it claimed also a path

ninety yards wide through all the enclosed and cultivated country and it prohibited all persons, even foot-passengers, from travelling on these roads while the sheep were in motion.

The number of migratory sheep is calculated at ten millions. They are divided into flocks, each of which is placed under the care of a *mayoral*, or chief shepherd, who has a sufficient number of others under his command, with their dogs. He uniformly precedes the flock, and directs the length and speed of the journey; the others, with the dogs, follow, and flank the cavalcade, collect the stragglers, and keep off the wolves, who regularly follow at a distance and migrate with the flock. A few asses or mules accompany the procession, in order to carry the little clothing and other necessaries of the shepherds, and the materials for the fold at night. Several of the sheep, principally wethers, are perfectly tamed, and taught to obey the signals of the shepherds. These follow the leading shepherd, having been accustomed to be fed from his hand; they lead the flock—there is no driving—and the rest quietly follow.

When passing through the enclosures, they sometimes travel eighteen or twenty miles a day; but when they reach an open country, with good pasture, they proceed more leisurely. Their whole journey is usually more than four hundred miles, which they accomplish in six weeks, and thus spend, in going and returning, nearly one quarter of the year in this injurious manner.

It may be readily supposed that much damage is done, carelessly, or unintentionally, or wilfully, to the country over which these immense flocks are passing; and particularly as the migrations take place at the times of the year when the property of the agriculturist is most liable to injury. In the spring the corn has attained considerable height, and in the autumn the vines are laden with grapes. The commons also are so completely eaten down by the immense number of migratory sheep, that those which belong to the neighborhood are, for a period, half starved. In addition to this, the servants of the Mesta, like the servants of government elsewhere, have little common feeling with the inhabitants of the country which they are traversing; they commit much serious and wanton injury, and they refuse all redress.

The shepherds and the sheep equally know when the procession has arrived at the point of its destination. It is necessary to exert great vigilance over the flock during the last three or four days, for the animals are eager to start away, and often great numbers of them make their escape. If they are not destroyed by the wolves, there is no other danger, however, of losing them; for they are found on their old pasture, quietly waiting the arrival of their companions, and it would be difficult to make any of them proceed a great way beyond this spot. Even the stray sheep are generally found on the particular unfenced portion of ground, called a *dehesa*, which is allotted for the flock to which they belong. The shepherds are immediately employed in constructing pens for the protection of the sheep during the night, and which are composed of ropes made by twisting certain rushes together which grow plenti

fully there, and attaching them to stakes driven into the ground. They next build, with the branches of trees roughly hewn, rude huts for themselves.

When the sheep arrive at their summer pasture, which at first is very luxuriant, the *mayoral* endeavors to guard against the possible ill effect of the change from the uncertain and scanty pasturage found on the journey, by giving the flock a considerable quantity of salt. He places a great many flat stones five or six feet from each other, and strews salt upon them; he then leads his flock slowly through the avenue of stones, and they devour the salt with great avidity. This is repeated on several successive days; and a case of general inflammation, or of hoove—the penalty too often paid by shepherds elsewhere for turning their flock unprepared on new and rich herbage—seldom occurs among the Spanish sheep.

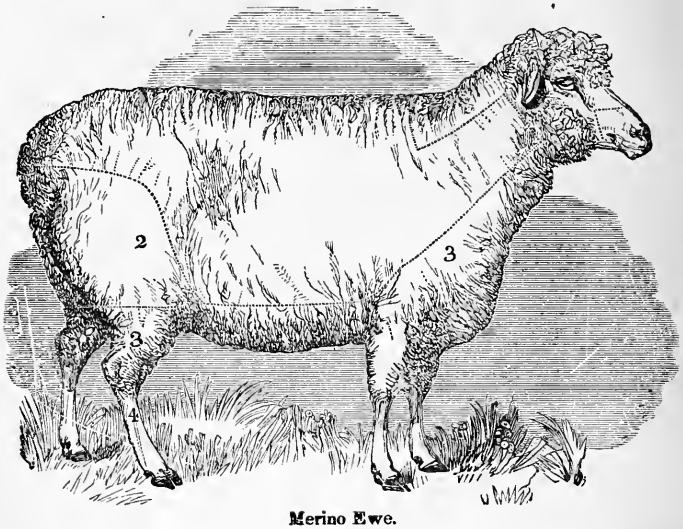
During the summer pasturage the labor of the shepherd is light. The ewes are put to the rams early in August. After their return at the close of autumn, and when yeaning-time approaches, the barren ewes are separated from the others and placed upon the poorest pasture. The Merinoes are not good nurses, and nearly half of the lambs—or in bad seasons, and when the pasture fails, full three fourths—are destroyed as soon as they are yeaned. The males are always sacrificed first: the others are usually suckled by two ewes—for it is a common opinion in Spain that the mother that fully suckles her lamb would yield less wool: they are afterward placed on the best pasture, in order that they may acquire sufficient strength for their approaching journey. The number of lambs slaughtered is sometimes so great that they are sold to the neighboring villagers for less than half a franc each. Most of the skins are sent into Portugal, and thence find their way to England, where they are used for the manufacture of gloves. Morning-gowns, both light and of good appearance, are frequently made from the skins. The wool is soft and silky, and is formed into little rings or curls.

Few of the male lambs are castrated, because it is believed that the weight of the fleece is much increased on the ram, without acquiring proportional coarseness.

The Merino fleece is in Spain sorted into four parcels. The following cut, while it contains the portrait of a Merino ewe, points out the parts whence the different wools are generally procured. The division can not always be accurate, and especially in sheep of an inferior quality, but it is more to be depended upon in the Merino sheep wherever found, for the fleece is more equally good, and the quantity of really bad wool is very small.

Both Lasteyrie and Livingston agree in this division. The *refina* (fig. 1), or the pick-lock wool, begins at the withers, and extends along the back to the setting on of the tail. It reaches only a little way down at the quarters, but, dipping down at the flanks, takes in all the superior part of the chest, and the middle of the side of the neck to the angle of the lower jaw. The *fina* (fig. 2), a valuable wool, but not so deeply serrated, or possessing so many curves as the *refina*, occupies the belly, and the quarters and thighs, down to the

stifle joint. The *terceira* (fig. 3), or wool of the third quality, is found on the head, the throat, the lower part of the neck, and the shoulders, terminating at the elbow: the wool yielded by the legs, and reaching from the stifle to a little below the hock, forms a part of the same division. A small quantity of very inferior wool is procured from the tuft that grows on the forehead and cheeks—from the tail, and from the legs below the hock (fig. 4).



Merino Ewe.

The Spanish wool, continues to be highly valued by the manufacturer; and the Spanish breed of sheep will be regarded with interest as the improver of the best old short-woolled ones, and the parent of a new race, spreading through every quarter of the world, and with which, so far as the fleece is concerned, none of the old breeds can be for a moment compared.

CHAPTER VI.

Saxon Merino Sheep.—Prussian Sheep.—The Silesian Sheep.—The Hungarian Sheep.—The Merino Sheep in Britain.—North American Sheep.

THE SAXON SHEEP.

The Elector of Saxony ranks among the first who patriotically and wisely devoted himself to the improvement of the inferior breed of sheep which pastured on the neglected plains of Germany. The indigenous Saxon breed resembled that of the neighboring states: a

consisted of two distinct varieties—one bearing a wool of some value, and the other yielding a fleece applicable only to the coarsest manufactures.

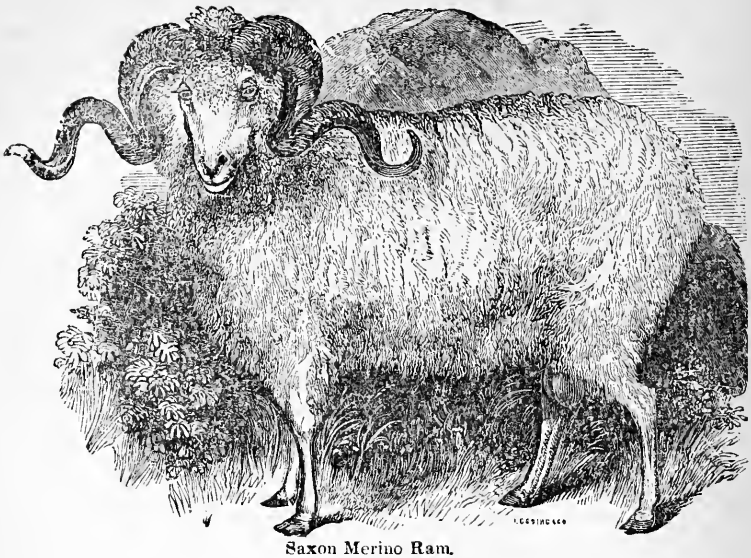
In 1765, at the close of the seven years' war, the elector imported one hundred rams and two hundred ewes from the most improved Spanish flocks, and placed a part of them on one of his own farms in the neighborhood of Dresden; this portion he kept unmixed. He endeavored to ascertain how far the pure Spanish breed could be naturalized in Saxony. The other part of the flock was distributed on other farms, and devoted to the improvement of the Saxon sheep.

It was soon sufficiently evident to the enlightened agriculturist, that the Merinoes did not degenerate in Saxony; many parcels of their wool were not inferior to the choicest fleeces of Leon. The best breed of the native Saxons was also materially improved. The prejudice against every innovation on the practice of their ancestors was, however, as strong in Saxony as elsewhere, and the majority of the sheep-masters were still averse to the improvement; but the elector was determined to accomplish his object: he imported an additional number of the Spanish sheep, and then, adopting a measure unworthy of such a cause, he compelled those who occupied land under him to buy a certain number of the Merino sheep.

It was not necessary long to pursue this compulsory system: the most prejudiced were soon brought to perceive their true interest. The pure Merino breed rapidly increased in Saxony; it became perfectly naturalized; nay, after a considerable lapse of years, the fleece of the Saxon sheep began, not only to equal the Spanish, but to exceed it in fineness and in manufacturing value.

The government of Saxony very materially contributed to this result, by the establishment of an agricultural school, and other minor schools for shepherds, and by distributing certain publications which plainly and intelligibly explained the value and proper management of the Merino sheep. The government of a country may fail to accomplish many capricious or tyrannical objects; but it will receive its best reward in the full accomplishment of its purpose, when it thus identifies itself with the best interests of its subjects.

In Saxony, as in Silesia, although the sheep are housed at the beginning of winter, yet they are turned out and compelled to seek, perhaps under the snow, a portion of their food whenever the weather will permit; and the season must be unusually inclement in which they are not driven into the courts at least for two or three hours during the middle of the day. The doors and windows also are frequently opened, that the sheep-houses may be sufficiently ventilated. Some sheep-masters, whose convenience is promoted by such a system, keep their flock in the house or the yard during the whole of the year; and it is not believed that the sheep suffer from this, either in their health, or in the fineness of their fleece. A great quantity of salt is usually given to the Saxon sheep, and principally during the summer, either in their drink, or sprinkled among the fodder.



Saxon Merino Ram.

The above is a portrait of a Saxon-Merino ram, the property of Lord Western, and used by him extensively and beneficially in the improvement of his Spanish Merinoes. It will be seen that his frame differs materially from the Spanish Merino: there is more roundness of carcass and fineness of bone, and that general form and appearance which indicate a disposition to fatten, and are tolerably certain pledges that the carcass will not be entirely sacrificed to the fleece.

Very great care is taken by the Saxon sheep-master in the selection of the lambs which are destined to be saved in order to keep up the flock: there is no part of the globe in which such unremitting attention is paid to the flock. Mr. Charles Howard, in a letter with which he favored the author, says, that "when the lambs are weaned, each in his turn is placed upon a table, that his wool and form may be minutely observed. The finest are selected for breeding, and receive a *first* mark. When they are one year old, and prior to shearing them, another close examination of those previously marked takes place: those in which no defect can be found, receive a *second* mark, and the rest are condemned. A few months after, they in like manner receive a *third* mark, when the slightest blemish causes a rejection of the animal.

PRUSSIAN SHEEP.

The Merinoes were introduced into Germany about the middle of the eighteenth century, and the advantageous change they effected everywhere they were introduced, could not be disputed. Notwithstanding this, Mr. Fink—to whom Germany owes much in regard

to sheep-culture—unwilling to give up altogether the native breeds, purchased in 1768 some Saxon Merinoes, and though his breed was much improved, yet his object did not seem accomplished, and in 1778 he imported some pure Merinoes from Spain. He took as the guide of all his experiments, that which is now received as an axiom among breeders, that the fineness of the fleece, and to a great degree the value of the carcass too, are far more attributable to the inherent quality of the animal than to any influence of climate or of soil. Uniformly acting on this fundamental principle, and being most particular in the selection of the animals from which he bred, he improved his own native flocks to a considerable extent, and he succeeded to a degree which he dared not anticipate, in naturalizing a still more valuable race of animals. His success attracted the attention of the Prussian government; and Frederic II., in 1786, imported one hundred rams and two hundred ewes from Spain. Mr. Fink was subsequently commissioned by the government to purchase one thousand of the choicest Merinoes; agricultural schools were established, and at the head of one of them was placed Mr. Fink—the most competent of all persons—the first improver of the Prussian sheep. The following was Mr. Fink's mode of management:—

He properly maintains, that free exposure to the air is favorable to the quality of the wool, and therefore, although the sheep are housed at the beginning of November, yet whenever it freezes, and the ground is hard, even although it may be covered with snow, the sheep are driven to the wheat and rye fields, where they meet with a kind of pasturage exceedingly wholesome, and while they feed there they are likewise benefiting the crop. Nothing is more common than to see a flock of valuable sheep scratching away the snow with their feet in order to arrive at the short wheat or rye beneath. When the weather will not permit their being taken out, they are fed on hay, aftermath, and chopped straw of various kinds. The kind of straw is changed as often as possible, and wheat, barley, and oat-straw, and pease-haulm, follow each other in rapid succession. The oat-straw is sparingly given, and the pease-haulm is preferred to the wheat and barley straw. Oil-cake, at the rate of six or seven pounds per hundred sheep, and dissolved in water, is also allowed when the flock can not be turned on the young wheat.

Three or four weeks before lambing, an additional allowance of hay and straw is given to the ewes; and while they are suckling, a little oat-meal is mixed with the solution of oil-cake. When the weather will permit the turning out of the ewes, the lambs are still kept in the houses, and the mothers brought back to them at noon and night; after that, the lambs are not permitted to graze with the ewes, but are turned on the fallows or the clover of the preceding year; for it is supposed that they unnecessarily fatigue themselves by running with their mothers, and almost incessantly trying to suck, and that on this account they refuse the herbage on which they are placed, and take less nourishment than when quietly kept on separate pastures. A few barren ewes are, however, placed with the lambs for the purpose of guiding them, and perhaps teaching them to select

the best and most wholesome food. More lambs are saved than are necessary to keep up the flock, and when they are two years old they are inspected—one third of the best of them are kept, and the remainder sold. The lambs are never shorn, in order that they may be better able to endure the cold and rain of autumn.

The Prussian sheep-dogs, like almost all on the continent, are trained to obey the shepherds, and are skilful in guiding the sheep, but they never worry or bite them. There is no natural necessity for it anywhere; and if flocks are occasionally wild and intractable, bad management and bad treatment have made them so.

THE SILESIAN SHEEP.

The native sheep were small, with long neck and legs, and the head, the belly, and the legs, devoid of wool. In the districts of Namslau and Oels was a superior breed, so far as the wool was concerned. They were never folded; they were housed at night, even in summer; the sheep-houses were ill-ventilated, and the dung removed from them only twice in the year.

Mr. Lasteyrie, the chief, or in fact the only authority in these matters, describes the labors of Count von Magnis to improve the Silesian flocks. When he retired to his vast estates at Eckersdorf, on which three thousand sheep were pastured, he found that the gross return from them amounted to only 1200 dollars (£225). He first attempted to improve his smaller sheep by crossing them with the larger breed of Hungary; but not succeeding in this to the extent of his wishes, he had recourse to the Merinoes. He spared no expense in order to procure the best rams: he sometimes gave as much as a thousand francs for a single ram. In process of time, the wool yielded by the greater part of his flock would bear comparison with the best of Spain, and at length exceeded it in fineness and value; and in the course of a few years his returns were multiplied more than twenty-fold. For the purpose of the best manufactures, the Silesian wool is almost equally valued with the purest and finest Saxony.*

THE HUNGARIAN SHEEP.

The Saxon-Merino was introduced into Hungary in 1775, by the Empress Maria Theresa, who also, at the same time, established an agricultural school. The progressive success of the Saxon sheep-husbandry began at length to make its due impression, and other Merinoes were procured from Spain in order to improve the flocks of Hungary; and the Hungarian sheep has finally rivalled, and even beaten, the Spanish Merino in the market of the world. The chief wealth of Hungary is now derived from the cultivation of the sheep. A recent statistical account gives to Hungary seven millions of sheep, of which three millions belong to Prince Esterhazy.

In every part of Germany and Austria, the number of sheep bred from the pure, or nearly pure, Merino, is constantly increasing

* The Silesian wool is at the present day more highly valued, for fine broadcloths and the finest fabrics, than that of Saxony, or of Spain, or of any other country.—*Am Ed.*

The German wool is accounted the finest and softest in the world. This results from the care there bestowed on the sheep, which is housed and nursed as carefully as the racehorse is in a sporting stable.

THE MERINO SHEEP IN BRITAIN.

England was late in attempting to naturalize the Spanish sheep, or to improve her own breed by an intermixture with them. There was some excuse for this, for she already possessed a clothing wool equal or superior to that of any other sheep except those of Spain; and her maritime habits and the extent of her commerce gave her easy access to the finer wools, far less necessary to the manufacturer at that period than fashion has now made them: at the same time her native combing wool was perfectly unrivalled. A few Merino sheep, however, were introduced here and there, but they had much prejudice to contend with, and their value was not duly appreciated.

The monarch who, at the close of the eighteenth century, swayed the sceptre of Great Britain, was an ardent agriculturist, and he determined to give this celebrated breed of sheep a fair trial on his own farms. In the year 1787 measures were taken for the collection and importation of a little flock of Merinoes. They were collected in Estremadura, on the borders of Portugal—a few from one flock, and a few from another. It was a kind of smuggling transaction; and as they could not be shipped from any Spanish port without a license from the king of Spain, they were driven through Portugal and embarked at Lisbon, landed at Portsmouth, and thence conducted to the king's farm at Kew. They did not please the royal adventurer. Hastily selected, or obtained as they could be from various proprietors and various districts, there was no uniformity about them; they could not be said fairly to exhibit the true character of their breed, nor was it safe to make any experiment with them.

It was then determined to make direct application to the Spanish monarch for permission to select some sheep from one of the best flocks. This was liberally and promptly granted; and a little flock was draughted of the Negrette breed, the most valuable of the migratory flocks, and the exportation of which was expressly prohibited by law. They arrived in England in 1791, and were immediately transferred to Kew: the sheep previously imported were destroyed, or otherwise disposed of.

The Merinoes found some early and zealous advocates, and among them Sir Joseph Banks, Lord Somerville, and Dr. Parry. On the other hand there was much prejudice to contend with, and it was thirteen years after the arrival of the Nigrette flock ere they had been able to establish themselves in the good opinion of a sufficient number of agriculturists to render it prudent to expose them to sale by public auction.

In 1811, a Merino society, with Sir Joseph Banks as president, was instituted, and from this time the Merinoes rapidly fell in the estimation of British agriculturists. The Merinoes are a most valuable breed of sheep; they yield a wool, which in fineness and manufacturing quality was then unrivalled; they have materially improved

the fleece of every short-woolled sheep which they have crossed, and have increased the length and weight of the staple, and adapted it for finer worsted stuffs; and it is not improbable, although the experiment has never been fairly tried, that, with careful management, the crosses being few and far between—they would give a finer and more valuable fleece to the long-woolled breeds; not injuring it for the purposes to which it is already applied, and rendering it useful for many other fabrics. It follows from this, that in every country where the farmer looks to the fleece, if not for his sole, yet his principal remuneration, the Merino will be duly valued, and will gradually supersede every other breed. In Great Britain, nevertheless, where the system of artificial feeding is carried to so great a degree of perfection—where the sheep is so early and profitably brought to the market—that breed, however it may ultimately increase the value of the wool, can never be adopted, which is deficient, as the Merinoes undeniably are, in the principle of early maturity, and general propensity to fatten.

Another circumstance connected with the decline of Merinoes in this country, is the change in manufactures, creating a greater demand for the wools of the native breeds, which were much improved in their fleece, and its carcass being greatly superior in weight and quality, were also productive of a larger renumeration to the breeder. Consequently the reputation of the Spanish Merinoes declined so far that few are now to be found in Great Britain.

The Saxon Merinoes yield, as has been already seen, a finer and more valuable wool than any which is imported from Spain. On another page is the portrait of a Saxon Merino belonging to that experienced and scientific agriculturist, Lord Western, and with which he is improving his former Spanish breed, and crossing some of the native sheep. Sir H. Vavasour, of Melbourne Hall, near York, and others, have likewise imported some Merinoes from Saxony. The Saxony sheep are decidedly superior to those brought immediately from Spain, not only in their wool, but in their general form and propensity to fatten. If the British sheep is ever destined to yield a finer wool, sacrificing little or nothing in point of carcass, it must be by means of the Saxon, and not the direct Spanish Merino.

NORTH AMERICAN SHEEP.

Until the introduction of the Merinoes into North America little that was satisfactory could be affirmed of the sheep of any part of that country. Many portions of the United States, and even of Canada, possessed advantages for the breeding of sheep that were not surpassed in Europe. The country was undulating or hilly—the hills covered with a fine herbage—the enclosures more extensive than in the best breeding districts of England—almost every pasture furnished with running water, and sheltered, more or less, by trees, against the summer's sun; yet the sheep were of the commonest kind: there was a prejudice against their meat; a prejudice against them altogether; and there was scarcely a district in which the wool was fit for any but the coarser kind of fabrics.

It might have been thought to be the policy of the mother-country to foster a prejudice of this kind, in order that her colonies might be as dependent as possible upon her; and particularly that her woollen manufactures might there find a ready sale: accordingly the American sheep, although somewhat different in various districts, consisted chiefly of a coarse kind of Leicester, and these were originally of British breed. The "American Husbandry," published in 1776, describes the New England wool as "long and coarse, and manufactured into a rough kind of cloth, which is the only wear of the province, except the gentry, who wear the finer cloths of Great Britain.

A writer in the Farmer's Journal, March, 1828, confirms this account, and applies it, but somewhat unfairly and unjustly, to the American sheep at that late period. "In a very few instances in British America I found a small number of the Leicester breed, but no good ones; but on my crossing the United States, I found none but ordinary, or what we should term very bad ones. The best American fleece I ever saw was not better than a middling Cambridge one, and in no place did I find any that would do for, or that could be applied to bombazine, or even fine stuff."

Mr. Livingston, who wrote in 1811, describes some exceptions to this general character of the American flocks. The first is a very singular one. "The Otter sheep were first discovered on some island on the eastern coast, and have spread to the adjoining states. The sheep are long-bodied rather than large, and weigh about 15lbs. a quarter. Their wool is of a medium fineness, and a medium length; but that which particularly characterizes these sheep is the length of their bodies, and the shortness of their legs, and which are also turned out in such a manner as to appear rickety. They can not run or jump, and they even walk with some difficulty. They appear as if their legs had been broken, and set by some awkward surgeon. They can scarcely exist in a deep country, and they can not possibly be driven to a distant pasture or market."

The Arlington long-woolled sheep, originally bred by General Washington, descended from a Persian ram and some ewes of the Bakewell flock. The sheep retain much of the form of the improved Leicester, and the staple of the wool is occasionally 14 inches long; it is soft, silky, and white, and calculated for hose, camblets, serges, and other fine woollen fabrics.

A peculiar breed of sheep is found on Smith's island, on the eastern cape of Virginia, and supposed to be the indigenous race of that part of the country. The size and form and fattening quality of the animal are far superior to those of the Merino —the fleece is heavier, being from five to nine inches in length, and it is so fine, as to be adapted for every purpose to which the Spanish wool can be applied. This account is given on the authority of Mr. Custis, the proprietor of the island; but further examination, although proving that the breed is valuable, both on account of its carcass and its wool, does not justify the high terms in which they have been frequently spoken of.

Since the prohibition of the exportation of British sheep has been removed, the finer Leicesters and other breeds have found their way across the Atlantic, and materially changed the character of some of the American flocks. The Merinoes have also reached the United States, and have been used in several of the northern provinces in improving some of the best American breeds. Mr. Livingston was very zealous in effecting this, and the system has been extending with decided advantage: it has reached even to the British colonies. Mr. M'Gregor calculates the number of sheep in Canada and the other northern transatlantic colonies to be 1,247,658; and a writer in the Onondago Journal says that "it would not be wide of the truth to put the whole number of sheep in the Union at thirteen millions, which, yielding an average 3lbs. of wool per head, will give a product of thirty-nine millions of pounds and constitute not an unimportant item in the estimate of national wealth." An increasing quantity of wool begins now to be imported by the mother-country from her American colonies, and from the United States. In 1833 it amounted to 335,649lbs.; but on the other hand the exports of woollen manufactures from England to those countries amounted to nearly three millions of pounds sterling.

CHAPTER VII.

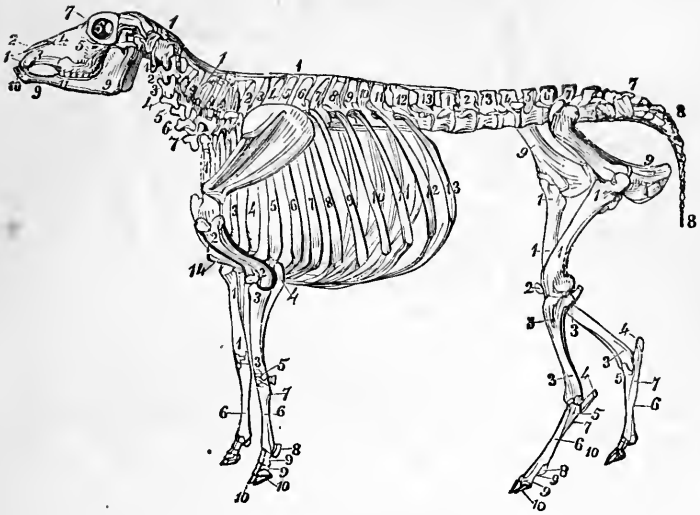
The Anatomy, Diseases, and General Management, of the Sheep.—The Skeleton of the Sheep.—Form of the Head.—Skull of a Polled Sheep.—Importance of the Size of the Head.—Swelled Head.—The Brain.—The Bot in the Sinuses of the Head.—Diseases of the Brain and Head.—The Cure.

It will be necessary to understand something of the anatomy and general organization of the sheep, in order to arrive at the most profitable way of managing him, and of preventing or curing the various diseases to which he is subject.

First, we present on the opposite page a skeleton, which is of a sheep of the New Leicester breed.

THE FORM OF THE HEAD.

In order to afford space for the attachment or origin of the horns, the frontal-bones project both forward and laterally, which gives the peculiar breadth of forehead and prominence of the eye to the sheep. This form of the upper part of the face is retained in breeds from which the horn has long ago disappeared. The breeds without horns are denominated *polled sheep*.



Skeleton of the Sheep.

THE HEAD.

1. The intermaxillary bone.
2. The nasal bones.
3. The upper jaw.
4. The union of the nasal and upper jaw-bones.
5. The union of the molar and lachrymal bones.
6. The orbits of the eye.
7. The frontal bone.
9. The lower jaw.
10. The incisor-teeth or nippers.
11. The molars or grinders.

THE TRUNK.

1, 1. The ligament of the neck supporting the head.
1, 2, 3, 4, 5, 6, 7. The seven vertebræ, or bones of the neck.
1–13. The thirteen vertebræ, or bones of the back.
1–6. The six vertebræ of the loins.
7. The sacral bone.
8. The bones of the tail, varying in different breeds from twelve to twenty-one.
9. The haunch and pelvis.
1–8. The eight true ribs, with their cartilages.
9–13. The five false ribs, or those that are not attached to the breast-bone.
14. The breast-bone.

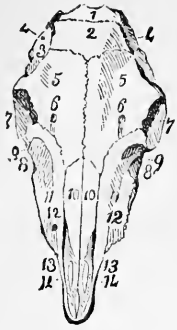
THE FORE-LEG.

1. The scapula, or shoulder-blade.
2. The humerus, bone of the arm, or lower part of the shoulder.
3. The radius, or bone of the fore-arm.
4. The ulna, or elbow.
5. The knee, with its different bones.
6. The metacarpal or shank bones—the larger bones of the leg.
7. A rudiment of the smaller metacarpal.
8. One of the sessamoid bones.
9. The first two bones of the foot—the pasterns.
10. The proper bones of the foot.

THE HIND-LEG.

1. The thigh-bone.
2. The stifle-joint and its bone—the patella.
3. The tibia, or bone of the upper part of the leg.
4. The point of the hock.
5. The other bones of the hock.
6. The metatarsal bones, or bone of the hind-leg.
7. Rudiment of the small metatarsal.
8. A sessamoid bone.
9. The first two bones of the foot—the pasterns.
10. The proper bone of the foot.

THE SKULL OF A POLLED SHEEP.



1. The occipital bone, depressed out of the reach of danger.
2. The parietal bones, the suture having disappeared, and also out of danger.
3. The squamous portions of the temporal bone—the buttress of the arch of the skull.
4. The meatus auditorius, or bony opening into the ear.
5. The frontal bones.
6. The openings through which blood-vessels pass to supply the forehead.
7. The bony orbits of the eye.
8. The zygomatic or molar bones.
9. The lachrymal bones, very much developed.
10. The bones of the nose.
11. The upper jaw-bone.
12. The foramen, through which the nerves and blood-vessels proceed to supply the lower part of the face.
13. The nasal processes of the intermaxillary bones.
14. The pelatine processes.
15. The intermaxillary bone, supporting the cartilaginous pad, instead of containing teeth.

The bones of the skull are thus disposed of in the sheep: The frontal bones occupy the whole of the broad expanse on the top of the head, extending from eye to eye. (See fig. 5.) They are prolonged as far below the eye as above it, encroaching upon and materially shortening the nasal bones (10, 10). Above, they reach to the parietal bones (fig. 2); but, before they arrive at this point, the head takes a sudden inclination downward, and a little of the posterior part of the frontal bones—that which is most concerned in covering the brain—is out of the reach of danger.

The concussion is tremendous when these animals rush against each other in good earnest; but from the peculiar arched form and strength of the bones which come in contact here, and the depression of the greater part of the brain far below, serious mischief is seldom effected. The horn is occasionally broken; the ribs, the limbs, may sometimes be fractured; at the rutting season the contest may end only with the death of one of the combatants; but it is comparatively seldom that the skull is fatally injured.

The *parietal* bones of the sheep (fig. 2), although not elevated to the summit of the arch, as in the horse, yet resume the function of which they are deprived in cattle. They constitute an important part of the posterior and slanting division of the skull, and have the same dense and firm structure which they possessed in the horse. At an early period of the life of the animal they are formed, as in the horse and cattle, of two distinct bones; but the suture between them soon disappears in the sheep, and they become one continuous bony arch over the greater part of the brain. Considerable strength is necessary here in order to sustain or neutralize those violent concussions which may occasionally be propagated from the frontal bones above.

THE IMPORTANCE OF THE SIZE OF THE HEAD.

The head of the sheep constitutes one of the principal points by which his quality and profitableness may be judged of. Compared with his general size, it should be small, and, particularly, not wide

between the eyes : too great width of forehead is an invariable proof of inaptitude to fatten, at least externally. The sheep with a large head will be a favorite with the butcher, because in proportion to the slowness with which he gets into condition will be the accumulation of fat within, even if there was no natural tendency to produce tallow : in other words, there will be more profit to himself at the expense of the grazier and consumer. The head should be small, thin, and short. It is possible, yet not probable, that this may be carried to too great an extent ; but that head must be disproportionately small which can be considered as a proof of too great delicacy of constitution. There is considerable danger in lambing when the head of the sheep is large, for the lamb will generally possess the characteristic form of the sire.

SWELLED HEAD.

The sheep, browsing so close to the ground as it does, is sometimes subject to swelled head, from being stung by vipers, and occasionally by venomous insects. The wool should be cut off round the wound, which should then be well washed with warm water, and afterward plenty of olive-oil should be rubbed in, and small doses of hartshorn diluted with water administered internally; half a scruple of the hartshorn in an ounce of water will be the proper dose, and should be administered every hour.

THE BRAIN.

Enclosed within the bones that have been described lies the brain It possesses the same form as in the horse and the ox, but is a little more prolonged in proportion to its size, and broader posteriorly than anteriorly. On looking attentively at it, it is perceived to be a little larger, in proportion to the size of the animal, than is the brain of the ox ; and, in point of fact, the brain of the ox is about one eight hundredth part of the weight of the animal, while the brain of the sheep is one seven hundred and fiftieth. This important organ is in the sheep, as in the horse and some other animals, composed of two substances, very different in appearance and structure —the one, from its situation on the outside of the brain, termed the *cortical*, or, from its reddish *ashen* color, the *cineritious* substance ; and the other, found more deeply within the brain, and termed, from its pulpy nature, the *medullary substance*.

These two substances, according to the opinion of the best physiologists, discharge two distinct functions : the cineritious is connected with the mind—it possesses the faculty of receiving impressions from surrounding objects, and of generating or producing power ; the medullary substance conveys the external impression and the mandates of the will ;—the one connected with *intelligence* and *power*, the other being little more than a *conductor*. The proportion of the two substances appears to be nearly the same in the sheep as in the ox, or, if there is any difference, the projections are bolder, and the layer of cineritious substance is proportionably deeper, in the sheep than in the ox.

THE BOT IN THE SINUSES OF THE HEAD.

Even in horned sheep the plates of the frontal bones are not so far separated from each other as in the ox, nor are the frontal sinuses so extensive, yet the sheep is subject to an excessive annoyance, from which the ox is comparatively exempt. There is a fly of the *diptera* order (flies with two wings, and behind them two globular bodies supported on slender pedicles, called, and properly so, poisers), the ŒSTRUS OVIS, or GADFLY of the sheep. It assumes its perfect winged form in some uncertain period from May to July, and then is an intolerable nuisance to the sheep, especially in woody countries, and in the neighborhood of copses. If only one appears, the whole flock is in the greatest agitation. They gather together, with their heads in the centre, and their muzzles buried in the sand, if they can find any, and are in continual motion, stamping with their feet, and snorting, in order to guard their noses against the assault of their puny enemy; then one of them, who is more especially attacked, will burst from his companions, and gallop across the field, looking fearfully behind him at every step.

The œstrus, impelled by powerful instinct, endeavors to deposite its eggs on the inner margin of the nose. By the warmth and the moisture of the part, they are almost immediately hatched, and the larvæ or little maggots crawl up the nose, and find their way to the residence which nature designed for them. In the act of passing up the nose they seem to give great annoyance; for the sheep gallop furiously hither and thither, and seem almost mad.

Having traced their circuitous course through an aperture under the turbinated bone into the maxillary sinus, they sometimes lodge there; others proceed thence into the frontal sinus, and some reach the cavity of the bone of the horn. They are found occasionally in every cavity with which that of the nose communicates. When it has arrived at, or selected, its place of residence, the larva fixes itself on the membrane of the sinus by means of two tentacula or hooks, which grow from the side of the mouth; and there it remains, feeding on the mucus secreted by this membrane, from June or July to May or June.

The larva is composed of eleven rings, which form a species of cone a little flattened. It is white when half, though darker at its full size, and has two small brown patches by the side of each other at its tail; these are the posterior stigmata, which are sometimes erect, but generally enclosed within the last ring as in a purse. Below, and in the same ring, is the anus, concealed by some fleshy folds. On either side is a fleshy appendage, the use of which is not known.

It is larger than the bot of the horse, but smaller than that which is sometimes found in the warbles on the backs of cattle. The head is armed with two crotchets; they are strong, and of a brown color, and have the appearance of little horns. By means of them the bot attaches itself to the membrane of the cavity in which it is contained.

At some time between the middle of April and the end of July

these larvæ have attained their full growth, and seek to escape from their prison. They give great annoyance to the sheep while this is taking place, who again are continually stamping with their feet, and violently sneezing. It is rarely that the exit of the grub from the nose is seen, owing to the impatience of the sheep, and his tossing of the head and continual sneezing. They who would make themselves acquainted with the appearance of the bot must purchase some sheep's heads at this time of the year, and saw them open. A great many will be found without any bots; a great many others will have one bot, some will have two, and a few will have three. It is not often that that number is exceeded; although, in a few instances, the head of the sheep has contained nearly a dozen of them.

When the worms are caught in the act of expulsion from the nose, or are taken in their perfect state from the cavities of a newly-killed sheep, they are very restless, and are continually marching, or rather dragging themselves rapidly along. When placed upon the hand, they find their way to the division of the fingers, and, using the points of their crotchets, they endeavor to force them apart. They soon get to the bottom of the loose earth or powder in the usual insect box; and if they are placed on the ground, and the soil is tolerably light, they very speedily bury themselves in it, and are lost. Those, however, that are not arrived at maturity, will quickly perish for want of the nutriment from which they were too soon taken. Those that survive in order to undergo their pupa state, form to themselves no artificial covering, but their skin gradually contracts and hardens around them. In twenty-four hours it begins to resist the pressure of the finger, and at the expiration of the second day the larva has become a perfect chrysalis. It is smaller than in its first stage of existence, but retains much of the same appearance, except that it has become of a more uniform brown-black color.

According as the season is more or less favorable, or in proportion to the warmth of the bed or the box in which the insect has taken refuge, the time of the pupa stage of existence is lengthened or shortened. M. Valisnieri states that a worm which he took on July the 5th underwent its final change at the expiration of forty days; but sixty-three days passed before one that he found in April became a perfect fly. Notwithstanding the hardness of the chrysalis, they seemed to escape from their prison with perfect ease. A small part of the head of the pupa becomes detached, and the fly creeps out.

The fly is considerably smaller than the size of the larva would indicate. Its head and corslet, taken together, are as long as the body and that is composed of five rings, tiger-colored on the back, with some small points, and larger patches of a deep brown color. The belly is of nearly the same color, but has only one large circular spot on the centre of each of the rings. The length of the wings is nearly equal to that of the body, which they almost entirely cover They are prettily striped and marked. The poisers are concealed by the small and shelly portion of the wings.

The head of the fly is singularly formed. It is large in proportion to the general bulk of the insect. The eyes have the appearance

of net-work, and are of a deep and changeable green color. They occupy less space upon the head than those of most other flies. In the small space between them are placed three other minute eyes, in the form of a triangle. They may be discovered in a tolerable light, or by a lens of small power. The rest of the head is yellow and seemingly hollow. It appears as if it were perforated by a great number of small holes, like a piece of sponge, and at the bottom of each of these cavities a small black spot appears. On the anterior and under part of the head are two short antennæ with large bulbous bases. There are very few hairs on the head, but many on the body, sides, and legs. A little beneath, and toward the throat, are three little brown spots or projections, in the form of a triangle. The fly has neither proboscis nor teeth, and its mouth, if it has one, is between these tubercles, and immediately behind the superior one; but it has never been distinctly seen, and it is usual for naturalists to describe this fly as not taking any nourishment during its last and perfect state, but living merely for one purpose, the propagation of its species.* It is, however, a negative account which must after all be given—the fly *has never been seen to eat.* M. Valisnieri has repeatedly offered these insects sugar and syrup, but they could not be induced to touch it, although he kept one of them more than two months.

The œstrus ovis is not the only fly which is believed to live for one important purpose alone. The same account is given of some species of butterflies, the male of which dies as soon as the female is impregnated; but she lingers on until she has found a proper receptacle for her ova, when she too expires, nature having denied to both of them the organs for the prehension and the digestion of their food.

The flies, both male and female, seem to be inert and sleepy beings: they will remain motionless on the side of the box for many a successive day. After the different sexes have been brought together, as it were by chance, the male resumes his motionless position for an uncertain time; generally but for a few hours—occasionally for some days—and then he dies; sometimes, however, having impregnated a second or a third female. The female likewise continues to exhibit the same picture of still life until her ova are ready to be produced. The flies are to be seen at these periods on the rails and walls in the neighborhood of some flock of sheep, and the shepherd, and the shepherd's boy, should be taught to distinguish and destroy them.

Both French and English writers give a fearful account of the mischief which the larva effects in its dark abode. Gasparin speaks of frequent convulsions, giddiness, and half unconsciousness, distinguished from turnsick by the violent sneezing with which it is accompanied. When the larva is creeping to its destined abode, and when, having reached its mature state, it is restless in its habitation, and seeking a way to escape, the sheep undoubtedly suffers considerable annoyance, which it manifests by stamping and sneezing; but otherwise, during the whole of the protracted abode of the insect in the sinuses of the head, there is no symptom by which its

existence, much less the mischief which it is supposed to effect, can be ascertained. It may be supposed that when parasites like these find their way to cavities or parts of the frame which nature never destined for their habitation, the animal who unwillingly affords them shelter may be much inconvenienced, and serious disease may be set up; but it is incompatible with that wisdom and goodness that are more and more evident in proportion as the phenomena of nature are closely examined, that the destined residence of the œstrus ovis should be productive of continued inconvenience or disease. There are no indications of cerebral irritation in the sheep which may not be fairly traced to other causes; and the permanent comfort and health, much less the life, of the sheep, would not be sacrificed to so insignificant a being.

There are two ways in which it may be imagined that these bots are serviceable rather than injurious to the sheep; and it is seldom that nature has recourse to expedients like those which have been described, except the benefit of both the parties concerned is promoted. Sheep are notoriously liable to determinations of blood to the head, and to inflammation of the brain. When a medical man suspects or is assured of this inflammatory disease in his patient, he endeavors to set up some counter-irritation, and in a neighboring part; and he thus diminishes or neutralizes, or entirely gets rid of the evil which he feared. Nature may possibly have placed this source of irritation, the presence, and sucking, and occasional motions of the bot, in the frontal sinuses, or at the root of the horns, in order to prevent or to diminish the tendency to cerebral disease, to which the sheep would otherwise be subject. This is Mr. Clark's suggestion.

TURNSICK OR HYDATID ON THE BRAIN

Many strange terms, as the gig-goggles-turn, turnsick, sturdy, giddy, dunt, &c., are given to this disease.

After a severe winter, and a cold and wet spring, many of the yearling lambs, and particularly those that are weakly, exhibit very peculiar symptoms of disease. This usually appears during the first year of the animal's life, and when he is about or under six months old. It is said to be occasionally congenital, and even the fœtus in the womb has been affected by it. It is far less frequent during the second year than the first, and after that period the sheep seem to have acquired an immunity against the attack of the hydatid.

The symptoms are as follows: The sheep cease to gambol with their companions—they are dull—they scarcely graze—they ruminate in the most languid and listless manner—they separate themselves from the rest of the flock—they walk in a peculiar staggering, vacillating way—they seem at times to be unconscious where they are, or they seek some ditch or brook, and stand poring over the ruffled or flowing water; they stand there until they appear to be completely giddy, and suddenly tumble in. In the midst of their grazing they stop all at once, look wildly around, as if they were frightened by some imaginary object, and start away and gallop at

full speed over the field. They lose flesh; the countenance becomes haggard; the eye wanders, and assumes a singular blue color. This last circumstance, although not observed so carefully as it ought to be, is perfectly characteristic of the disease; and a clever shepherd would select every *sturdied* sheep from the flock, guided simply by the color of their eyes.

This evident cerebral affection increases; the animal begins to carry his head on one side, and almost always on the same side. It is with difficulty that he can straighten his neck in order to graze, and there is a peculiar undecided motion in the act of grazing. The fits of wandering become more frequent; he is oftener frightened without apparent cause; he takes an increasing pleasure in poring over the rippling brook; there is something in the playing of the light on the water, or in the murmuring sound, which has a lulling influence over him, and he oftener forgets himself, and perhaps falls in and is lost.

By-and-by the sturdied sheep commences a rotatory motion, even while grazing, and always in one way, and with the head turned on the same side. This occurring, he almost ceases to eat or to ruminate, partly because the disease, from its debilitating character, destroys the appetite altogether; and also because he can not restrain those circular motions, during which it is almost impossible to graze: but principally because he is rapidly becoming blind. He begins to be inattentive to surrounding objects, and he moves among them as if he were unconscious of their existence. The habit of turning round increases: he continues to form these concentric circles for an hour at a time, or until he falls; and then he scrambles up again, and commences the same strange motion. At length he dies, emaciated and exhausted; or his death is hastened by his falling down some dangerous declivity, or his being unable to extricate himself from the brook or the ditch.

Turnsick can scarcely be confounded with inflammation of the brain, when the anxious yet half-vacant countenance, the absence of furious delirium and of all desire to do mischief, are regarded. If the sheep is galloping wildly about, it is evidently to avoid some imaginary evil, and not to encounter a supposed foe.

It may be distinguished from rabies by nearly the same symptoms, and particularly by the absence of all desire to injure its companions.

It can scarcely be confounded with apoplexy or inflammatory fever, for they usually attack the flower of the flock, while the comparatively debilitated sheep is the prey of the hydatid. The victim of these diseases can scarcely be induced to move; the sturdied sheep is wandering about or scampering everywhere, without apparent motive or object. The progress of apoplexy and inflammatory fever is rapid, and a few hours decide the fate of the patient; the sturdied sheep will linger on during several successive weeks. The one dies in full condition—the other wastes away to a mere skeleton.

On examining the sheep after death, a hydatid, or many hydatids, are found between the pia-mater and the brain, or imbedded in the

cerebral substance. The existence of these hydatids has been doubted in the human brain. There is, however, no doubt about the matter here; they are true hydatids, but of a very singular structure, and such as have not yet been observed in the human being.

They belong to the Cœnurus, or the HYDATIS POLYCEPHALUS CEREBRALIS, *the many-headed hydatid of the brain.* Instead of a single head there are a great number spread over the surface of the parasite, and opening into the same general cavity. When the sac is distended they appear only as opaque spots upon it; but a lens of no great power will give a distinct view of their heads, or rather necks, with the tentacula or barbs projecting from the apparent opening or mouth, which forms the extremity of them. These hydatids vary in size from that of a pigeon's to a hen's egg.

The wall of the cyst appears to be composed of two or three layers, the centre one of which seems to possess a muscular character. On examining them with lenses of a high magnifying power, "their coats resemble paper made upon a wire-frame, the muscular fibres so plainly and regularly interlacing each other.'

When the hydatid is first extracted and placed in warm water, it has an evident vibratory motion; and if then punctured, the contained fluid will be ejected to a considerable distance, in consequence of the powerful contraction of the muscular coat. The inner membrane is clearly marked with rugæ, which have considerable resemblance to the villous membranes of the stomachs of many animals.

This cyst or bladder contains a fluid, sometimes as pellucid as water. If the internal membrane is then examined, and particularly with a lens, a countless multitude of little bodies, resembling eggs, and disposed in regular lines, will be found to adhere to it by filmy particles; but the fluid will not contain any organized body. At other times the water within the cyst will be turbid, and will contain innumerable portions of apparently fibrous matter, but which, submitted to the power of a microscope, are resolved into so many minute worms. If the fluid is very turbid, that is caused by the immense quantity of worms, and the eggs will all have disappeared; when the turbidity is not so great, many of the eggs will still be observed adhering to the cyst.

These worms are about half a line in length. The head is in the form of a tetragon, with a circle of rays or tentacula at its summit, and a mouth on each of the four sides of the head. The neck is short, and the body is covered with rings or wrinkles. They appear to swim with great velocity, and to be possessed of much activity. They have also the peculiar property of issuing at pleasure from and returning to the cyst which they inhabit. If the cyst is removed whole from the brain, hundreds of them may be forced through the numerous heads of the hydatid by the slightest pressure; and at other times, when the cyst is examined, numbers of them will be found in or protruding from its various necks

It is not uncommon for a very great number of small hydatids to be found floating in a larger one, seemingly the parent of the colony The writer of this treatise was examining a monkey that had died of

some obscure disease. Between the peritoneum and the abdominal wall, he found a hydatid larger than the egg of a goose. He endeavored to extract it whole, but it broke, and its contents flowed over the table. They consisted of an immense number of hydatids. He mentally divided the surface of the table into a certain number of compartments, and on counting the number of globules which one of them contained, he found that the whole would consist of considerably more than ten thousand. In addition to these he found an almost countless number of granules or vesicles on the rugous lining surface of the hydatid, and which were probably the germs of future hydatids. But there are few or no instances of this production of worms and such a provision in the parent for their habitation and protection. It somewhat resembles the pouch of the kangaroo and the opossum, or the stomach of the viper.

Are these worms hydatids in one of the forms they assume, or are they parasites, which take possession of the cyst appointed by nature for their residence? What object are they accomplishing in this their strange abode? The ovum, or germ, may be floating in the atmosphere, or received with the food, and, like some other *entozoa*, and more particularly the worm in the eye of the horse and the ox, may thread the various blood-vessels, whether of a larger size, or the minutest capillaires, until it arrives at its destined nidus or residence—the brain of a weakly sheep. Are there certain conditions of the brain, under which these parasites may be spontaneously produced? If so, what are the laws and conditions of these productions? or why should their appearance be confined to the very youth of the animal and a state of general debility, if not disease? These are mysteries which future observers, perhaps, may be enabled to unravel.

If there is only one hydatid, and it is suffered to attain its full growth, or, in other words, if the disease is permitted to take its course until it has destroyed the sheep, it will probably be of very considerable size, and a great portion of the brain will be absorbed. Mr. Stephens related the following history of a case at one of the meetings of the London Medical Society. A sheep with sturdy or turnsick was brought to him. He took out a portion of the skull with a trephine, and on cutting through the dura-mater, a very large hydatid partially protruded. He attempted to extract it whole, but it broke. He afterward extracted the cyst, and on looking into the opening made with the trephine, he found the interior to present a large empty cavity. The brain appeared to be completely gone. He let down a wax-light through the opening into the cavity of the skull, when it appeared that nearly the whole of the brain was wanting. The hole was closed, and the sheep got up and fed, but in the morning of the fourth day it became convulsed and died. Upon opening the head a little only of the brain at its base was found, and some remains at the sides, forming an imperfect shell of brain, and there were several hydatids remaining.

If there is only one parasite inhabiting the brain of a sturdied sheep, its situation is very uncertain. It is mostly found beneath

the pia-mater, lying upon the brain, and in or upon the scissure between the two hemispheres. If it is within the brain, it is generally in one of the ventricles, but occasionally in the substance of the brain; and, in a few instances, in that of the cerebellum.

These hydatids are probably exceedingly small when first deposited in the brain, and they produce little disturbance there. No altered function will tell of their presence, except that the sheep will sometimes be dull, and will eat lazily, and without appetite, or will stop in the middle of his eating, and seem confused and lost. When, however, they have attained a considerable bulk, and press upon the neighboring vessels, or the origins of the celebral nerves, their presence can scarcely be mistaken; and an accurate knowledge of the anatomy of the brain, and careful observation of the patient, will enable the practitioner to guess at the situation of the parasite. If the head is held constantly on one side, and the concentric circles are always formed in that direction, the cyst will be found on the depressed side, and probably in the lateral ventricle. If the head is sometimes held on one side, and sometimes on the other, and the circles are occasionally in one direction, and then in a contrary one, there is a hydatid on each side of the head, and probably in the ventricles. If the sheep marches straight forward with his head depressed, running against everything in his way, and continually falling, it is likely that the parasite occupies the middle scissure of the brain, and is attached to the corpus callosum. In a few cases the muzzle will be elevated and the head thrown back, the animal still pursuing its straightforward course, except that there will be a reeling motion, sometimes to the right, and sometimes to the left, like a boat at sea; the intruder then inhabits the cerebellum or the fourth ventricle.

Possibly, however, there are more cysts than one, and these occupy very different situations in the brain. In that valuable periodical just referred to, an account is given of two sturdied sheep, in the brain of each of which four vesicles were found. In one of them the principal hydatid occupied the right ventricle, and smaller ones were found between the hemispheres, and in the fourth ventricle and the ethmoidal cell, or digital cavity. In the other, the principal one was found in the digital cavity; and the others in the right side of the fossa sylvii, under the pia-mater, on the left lobe of the brain and in the cerebellum. In these cases the indications during life would be obscure, and no operation would be of service.

This is a singular disease; but it is a sadly prevalent and fatal one in wet and moorish districts; yet it will be seen by-and-by that this is the mildest of the scourges which the sheepmaster brings upon his flock by the neglect of draining. It is scarcely known in airy and upland pasture, or even in the lower grounds that have been thoroughly drained.

It is much more fatal in France than in Great Britain, on account of the general neglect of the sheep, and the almost total omission of this indispensable operation in well-conducted sheep-husbandry. Perhaps also much may be attributed to the neglect of the young

sheep, and not a little to hereditary disposition. It is supposed that nearly a million of sheep are destroyed in France every year by this pest of the ovine race.

The means of cure are exceedingly limited. They are confined to the removal or destruction of the vesicle. Medicine is altogether out of the question here. Neither the warm bath, nor "the mercurial friction," nor "the repeated dose of physic," recommended by various writers, can have the slightest effect. Veterinary surgeons have hitherto been little employed in the treatment of turnsick, because the diseases of sheep have until lately formed no part of the education of the veterinary pupil, and even at the present hour are scarcely heard of at the National Veterinary school. This is a lamentable and disgraceful state of things; and the agriculturist deserves all the inconvenience and loss which he experiences, if he permits it longer to continue.

The contrivances to remove or destroy the cyst that have hitherto been resorted to, proceed chiefly from the ingenuity or the brutality of the sheepmaster or the shepherd. Mr. Parkinson says that his father's remedy was to cut off the ears of the sturdied sheep, and that rather by way of bleeding than with any other intention; and that a sheep now and then, perhaps one in twenty, was thus cured. "It happened one day," he proceeds, "that when I was with my father's shepherd, I observed one of the half-year-olds, although not entirely leaving the flock, yet having the appearance of being affected with the disease. The shepherd was an extraordinary good runner; but this sheep gave him a severe chase, and he was some time in catching it, which put him in a passion, and happening to take it by the ears, he twirled it round several times before I got to him; I then cut off its ears as near to the head as I could with safety, it being our usual practice to cut them off pretty close; but by swinging it round the shepherd had probably pulled the ears out of the socket. The result was, that in about two days the sheep had rejoined the flock. Since that recurrence, I have made it a rule constantly to pull the ears very hard for some time before I cut them off, and this proceeding has seldom failed of effecting a cure."

It is easy to imagine that in the dreadful struggle which must ensue in wringing the ears so "very hard," and then cutting them off, the hydatid would probably be ruptured and destroyed.

Others effect the same object in as brutal a way. They set the dog on the poor sheep, to hunt and worry it without mercy; and the chase is so contrived, that, if possible, the animal shall tumble down some stone-pit, or considerable declivity. In the shock of the fall the hydatid is burst, and, now and then, the neck of the sheep is broken too.

Several cases are gravely related in confirmation of this practice. A sturdied sheep was frightened by a pack of hounds, that came into the field in which it was grazing. It leaped over a high hedge, fell violently on the other side, and from that moment was well. Another was standing on the edge of a precipice—he, too, was frightened, and fell to the bottom, and was ever afterward free from

the disease. All these modes of proceeding are far too brutal and barbarous.

The Ettrick shepherd adopted a very ingenious operation. He shall speak for himself: "When I was a youth, I was engaged for many years in herding a large parcel of lambs, whose bleating brought all the sturdies in the neighborhood to them, and with whom I was everlastingly plagued; but as I was frequently knitting stockings, I fell upon the following plan: I caught every sturdied sheep that I could lay my hands upon, and probed him up the nostrils to the very brain with one of my wires. I beheld, with no small degree of pleasure that I cured many a sheep by this operation."

Mr. Hogg candidly owns that the sheep which die in consequence of wiring are "in the greatest agonies, and often groan most piteously." He also acknowledges, that in a few instances he has seen the sheep drop like a creature *felled*, and expire in the course of two minutes; and it is well known that, on dissection, the brain is found inflamed, and the course of the wire is as evident as anything can be, presenting an appearance as if a probe as large as a quill had passed through the brain.

In addition to all this, there are sometimes two or three of these hydatids in the same brain, and occupying very different situations in it, so that the wire can not possibly reach them all. It probably, therefore, will be the fate of this once celebrated operation, and which the name of the Ettrick Shepherd for a while rendered popular, to fall into comparative disuse and distrust.

The effect of pressure has not always been sufficiently understood in veterinary or human practice. The slight but constant pressure of this bladder is not only sufficient to cause a portion of the brain to be absorbed, in order to make room for the growth of the hydatid, but even the bony substance of the roof of the cranium disappears; and therefore, in process of time, a soft yielding spot, somewhat variable in its situation, but generally a little anterior to the root of the horn, or where the horn would have been, or, in a slight degree, more toward the centre of the skull, marks the residence of this parasite. Another kind of operation can now be attempted in order to get rid of this formidable being.

A square is drawn, in the mind of the operator, upon this softened part, one side of it being equal to the diameter of the trephine which he is about to use. Two incisions are made, diagonally, from corner to corner of this square, and the four flaps thus formed are dissected from the parts below and turned back. If any portion of bone remains, it is then removed by the trephine; or if the bone is quite gone, two other incisions are cautiously made with the knife, in the same direction as before, through the pericranium and the membranes of the brain; and when these flaps also are turned back, the hydatid will generally be visible underneath. It will be a matter of some importance and interest to extract the hydatid whole; but this will not often be practicable. Every portion of it, however, and of the fluid which it contained, must be carefully removed; and then the membranes and the integument must be restored to their

situation, and a soft pledget, or, what is better, an adhesive plaster, must be put over the whole.

Some operators, afraid of the large opening into the cranium caused by the trephine, have contented themselves with puncturing the cyst at the spot at which the skull is softened. But to this operation, as also to that of the trephine, there are serious objections. Both operations are dangerous to the sheep, and uncertain in their results. Besides, they are necessarily delayed until the later stages of the disease, when it may have become incurable.

There is still another question to be taken into consideration. Supposing that the hydatid has been destroyed, and a seeming cure has been effected by either operation, is there any certainty that the evil is permanently removed? No. The most successful cases must be regarded with much suspicion. No sooner has one hydatid been removed, than another will, too often, begin to develop itself. Huzard has counted no less than thirty distinct cysts in the brain of a lamb; therefore, the operation may have to be repeated almost without end, and after all the animal will perish. Six or nine months may pass, and the animal may not be safe. As for medicine, it is altogether out of the question: no drug has power to reach the hydatids and destroy them in their place of concealment. Considering, however, the cause of the disease, and the almost invariably impoverished state of the animal, he should be removed, immediately after the operation, to a more wholesome pasture, and particularly a dry and upland one.

What then is the duty of the farmer? Why, to fatten the lamb that has been operated upon, and to sell him as speedily as he can; for it appears that, in too great a portion of cases, three months will scarcely pass ere the disease will return. What shall he do with the sturdied sheep that has not been operated upon? Send him immediately to the butcher, in whatever condition he may be. The chances are that he will eventually die, and die worthless—a mere skeleton; at present he will probably fetch some price, and the wholesomeness of the flesh has not been in the slightest degree impaired by this disease in its earlier stages. What shall he do with regard to his flock generally? Take more care of them—fatten them as quickly as he can, and slaughter those that become affected the very moment the disease is ascertained. Is there anything more that he can do? Yes! He should take better care of the ewes and the lambs in the early part of the spring. There is no necessity for him to adopt a system of nursing which would render his flock unable to endure the sudden changes of the English climate: but there is a recklessness about many sheep-masters with regard to the mother and the offspring, at yeaning time, which can not be too strongly reprobated, and for which they severely and justly suffer. More attention might likewise be paid to the pasturage on which the sheep are turned. It should be more suitable to their early age, somewhat better sheltered, and, where it is required, more carefully drained. The disease is the consequence of debility—and that debility is caused by the inexcusable neglect of the owner of the

sheep. It is the offspring of cold and wet and hunger, and nature herself points out the cure; for when the winter and the early months of spring have passed, the disease almost disappears.

M. Giron de Buzaseinques, in an essay on turnsick, read before the Royal and Central Societies of Agriculture, in 1824, thus expresses himself: "I have put into practice my mode of prevention. I have fed my flock better, and given them more exercise. I have driven them on the mountains of Aveyron, where the salubrity of the air and the diversity of the herbage invite them to stray about, and to cull the sweetest food. I have placed salt within their reach: and by such regimen I have strengthened my sheep; and the consequence has been, that I have had less turnsick among them. The malady is on its gradual decline, and I reckon, by perseverance, to get completely rid of it."

WATER IN THE HEAD.

There is occasionally, and even more frequently in the lamb than in the calf, an effusion of serous fluid within the cranial cavity. It is not confined within a cyst—it is not a portion or part of a living animal, as in the disease just treated of—but it accumulates between the two investing membranes of the brain—the *pia mater* and the *arachnoid coat;* or it is found within the latter; or, and more frequently, it occupies and distends the ventricles of the brain.

It is sometimes *congenital:* it attacks the lamb while in its fœtal state. The bones being then comparatively soft, and the sutures not closed, the head is distorted and enlarged, and delivery is rendered difficult, if not impossible, with safety to both the mother and the lamb. In such case, before the mother is too much exhausted or injured by rude attempts to deliver her, it will be advisable to perforate the head of the fœtus, and evacuate the fluid—an operation which is inevitably fatal to the young one, but insures the life of the ewe.

The cause of this congenital *hydrocephalus*, or *water in the head*, is unknown; the existence of it can at no time be detected previous to parturition, much less can the period of its commencement be ascertained. It may, however, without much danger of error, be traced to weakness of constitution in one or both of the parents, or to neglect and starvation during the period of utero-gestation. If one or two cases of this disease in the lamb occur, the farmer will do well seriously to review his whole system of management; at all events, he should never again breed from the same ewe, for there are few diseases in which hereditary predisposition is so evident as in this. If two or three cases occur in the flock, and the general management is good, and the ewes apparently healthy, the ram may be suspected, and should be dismissed.

Young lambs oftener die of water in the head than the shepherd or the sheepmaster suspects. How often, a very short time after birth—the appetite sometimes failing, but more frequently becoming almost voracious—the bowels sometimes relaxed, but oftener constipated—does the lamb become dull and disinclined to move—stag

gering a little as he walks—presenting a greater or less degree of stupidity, either in the expression of the countenance or his mode of action, or both—pining away almost to a skeleton—and dying, occasionally, before the expiration of the first month, and rarely surviving the second. The disease is described by no writer, but it is familiar enough to the sheep-owner. These are generally cases of water in the head: the skull is a little enlarged—the bones of it thin, or sometimes strangely thickened—the ventricles filled with water—the walls of them diminished in thickness, or having become almost membranous. Under the pressure of this unnatural quantity of fluid, the powers of the mind and of the body have gradually sunk. Such a disease must generally be incurable; but in a few cases a successful struggle might be made against it. The principal dependence would be placed on purgatives and tonics combined—the Epsom salts with ginger and gentian, and small doses of mercurial medicine—the blue pill—in doses of four or five grains, being sufficiently manageable, and, at the same time, the safest and most efficacious preparation. Plenty of good milk should be allowed from a foster-mother, as well as from the real one, with exercise and air, and good food, according to the convenience of the owner. If no other advantage were gained from a knowledge of the true nature of this disease, the farmer would at least be taught that there was something wrong in the breed or the management, or the situation, and the proper remedy might possibly suggest itself.

ABSCESS IN THE BRAIN.

This disease is mentioned, because one case, and one only, has come under the notice of the author. In sawing through many heads, in order to obtain the larvæ of the œstrus ovis in different stages of maturity, he found an abscess in the centre of the right hemisphere, containing more than an ounce of dirty-white purulent matter, resembling the pus found in other parts, but of almost intolerable fœtor. The substance around was softened, and of nearly the same color. It seemed as if the abscess was in a state of active enlargement. He immediately carried the head to the man at whose shop it was bought, with the hope that he might be able to trace it to the butcher; but so many passing through the hands of this person, he did not recognise it. It may be safely taken for granted that the sheep was in the ordinary condition of those that are slaughtered for the market; and the case is an illustration of the extent to which these processes may be carried without interfering with general health.

APOPLEXY.

This is a very frequent and fatal species of pressure on the brain. It is even more prevalent in the sheep than the ox. The forcing system of feeding is carried to a greater extent, if possible, in the sheep than in cattle; and there is this peculiar danger—that, while the comparatively thin hair of the ox allows of a considerable degree of cutaneous perspiration, the woolly coat of the sheep, and the greasy yolky matter with which he is surrounded, materially dimin-

ısn, or almost entirely prevent, the superabundant fluid from escaping. The sheep is therefore naturally a more plethoric animal than the ox, and more liable to all the diseases connected with redundance of blood, and to apoplexy among the rest.

Let it be supposed that a flock of sheep, apparently in perfect health, are grazing on a pasture somewhat too luxuriant. They have been lately put upon it; they have perhaps been driven a little distance to it, and the weather is hot; or let it be supposed that the pasture is good and the sheep in high condition. Suddenly one of them stands still—he seems to be fixed to the spot; or, if he attempt to move, his hind legs fail him—the pupils are dilated and motionless—the eyes are fixed and almost blind—and he stumbles over everything in his way. Tessier says that he will march into the middle of a pack of hounds, and that their barking does not affright him; in fact, he is unconscious of everything around him. The conjunctival and nasal membranes are of a deep red or violet hue, the nostrils are dilated, the pulse hard and full, and the breathing generally stertorous. Presently he begins to stagger—he falls—he struggles —he dies: and all this takes place in less than a quarter of an hour. If he had been carefully looked after this might have been foreseen, and probably prevented It would have been observed that the sheep was dull—that he lagged behind as he travelled to the pasture —that his flanks heaved a little, and, possibly, that rumination had ceased; precautionary measures might then have been taken.

The author is in the habit of attending the annual meeting of the Smithfield club, and certainly, as he goes from pen to pen, he admires the beautiful symmetry and the high condition of the rival South-down and Leicester sheep, which are there exhibited; yet the pleasure is somewhat alloyed by the recollection that they are in an unnatural and dangerous state, and that there may be scarcely a step between them and death. He is struck with the appearance of a particular sheep. "Ah, sir!" says the owner, "I thought to have had a pen of them, but two of them died of inflammation just as I was about to start." "I lost one on the journey," says another. "And I lost one," says a third, "for which I would not have taken fifty guineas."

"They all died of inflammation." No such thing. It was apoplexy —the blood-striking, the *apoplexia fulminans* of the old writers, the *apoplexie foudroyante* of the French. They had been brought to the highest and most dangerous state of condition. Every vessel was filled with blood. They were disturbed by the preparation for their journey, or by the fatigue of it. The heart beat quicker and more powerfully: an additional quantity of blood rushed through the frame. It was impelled to the brain as well as to other parts. But the brain is enclosed in an unyielding case; and when the arteries and the capillary vessels are distended with blood, they press upon the veins, and the coats of the veins being of a far more yielding nature than that of the arteries, large and small, they yield, and the passage through them is materially diminished, or obliterated. The heart still labors to force the vital current on—the arteries be-

come more and more distended—the veins become impervious—the pressure is dreadful, but the bony covering of the brain yields not. The base of the brain, whence arise the nerves of sensation and motion, is compressed, benumbed, and its functions are suspended—the animal has lost all feeling, and all power of voluntary motion. The portion of the ganglial system, which supplies the brain, becomes powerless under the same deadly weight, and life is suspended or lost. There is no *inflammation!* Inflammation is a very convenient term to conceal many a blunder and many a false theory. It is sudden and fatal oppression of every vital organ; not produced by a more violent determination of blood to the head than to other parts, as the language of some writers would suggest, but by the inability of the vessels of the brain, by reason of the unyielding bone that surrounds them, to circulate that increased quantity of blood which the vessels of other parts can readily dispose of by means of the expansibility of their coats, and their consequent enlarged calibre. It is in a state of general plethora, *which may become the parent of inflammation;* but is not the necessary cause of it. It is a highly dangerous state, of which sheep-breeders dream not when they view with delight the high condition of their flocks, and hasten the production of that high condition by every means in their power.

When a flock of sheep is approaching to that *condition*, which some breeders are so anxious to produce, it should be very carefully watched; and if one of them is found lagging behind—standing still, if he can—his head hanging down—half stupid, half blind, and half deaf, he should immediately be bled, and to the extent which the case may indicate, or the animal will bear. A pound is perhaps about the average quantity that should be drawn at the first bleeding; and that not taken from the eye-vein—the vessel usually opened by the shepherd, and the farrier too—for the most adroit of them can not always obtain any great quantity of blood from this vein, and seldomer can they obtain it so rapidly as it should be drawn—but from the jugular, a vessel quite as easily opened, and from which the blood will flow in a much fuller stream. No harm could ever ensue from this bleeding, and many a valuable animal would be saved.

Four ounces of Epsom salts should be administered as soon as possible after the bleeding, and an additional ounce every six hours, until the bowels are opened. The sheep should be removed to poorer pasture, or taken into the farm-yard, and very sparingly fed during a few days afterward.

It should be deeply impressed on the mind of the sheep-master, that although, from strength of constitution, sheep may struggle against an attack of apoplexy, and the most alarming symptoms may gradually disappear, yet, except the depletive measures just recommended have been adopted, the recovery will be delusive. The disease will pass into a chronic state; and at length will terminate in the death of the patient, attended by all the symptoms of inflammation of the brain.

That farmer would act judiciously, who, having lost one or two sheep by apoplexy, were, in addition to a change of pasture, to ab-

stract about half a pound of blood from, and give 4 oz. of Epsom salts to, every one that is in tolerable condition. He might avert impending mischief—he would improve, rather than diminish, the condition of his flock, and he would render that condition safe. This is particularly expedient at the beginning of the summer.

INFLAMMATION OF THE BRAIN.

Inflammation—sometimes of the substance of the brain, and, at other times, of its membranes, and occasionally involving both of them, is not of unfrequent occurrence. Inflammation of the substance of the brain often follows the attack of apoplexy. In an early stage of the disease the eyes are red and protruded—the animal is at first dull and heavy, and disinclined to move; but the scene soon changes—the eyes brighten—the flanks begin to heave—the sheep is in constant motion—he cocks his tail, and gallops about the field, and attacks his companions or the shepherd, or even a post or a tree that may chance to attract his attention. This ferocity—the effect of temporary delirium—has been confounded with madness: the manifest difference of character and symptoms will be best described when the latter disease is treated of.

The causes are nearly the same as those of apoplexy—too stimulating food and too great redundancy of blood, over-driving, and, occasionally, atmospheric influence. As for the treatment, the case too frequently will not admit of any. If the animal can be approached and managed during a remission of the more violent symptoms, he should be bled unto fainting. Physic will be more easily given. The sheep, like the ox, seems to have an insatiable thirst when he is laboring under this disease; and therefore he may be cheated with a solution of Epsom salts, and possibly half a drachm of the farina of the croton nut. Use should also be made of some temporary remission of the symptoms in order to confine the animal, and take from him the power of doing mischief. Should the phrensy appear to be subdued, dependence can not always be placed upon him, for, if subjected to the least restraint or annoyance, the fit will sometimes return; and, at all events, although the inflammation may appear to be subdued, so much mischief may have been previously done, that the animal will pine away and die a mere skeleton. A continued course of purging and fever medicine must be entered upon and pursued, and the animal disposed of as soon as possible.

Phrensy, or brain-fever, occurs more frequently among lambs than adult sheep. Mr. Tait, of Portsoy, gives an interesting account of this malady in lambs—an abridgment of which is here subjoined:—

"Some time ago I was requested to look at a flock of sheep. Upon inquiry I found that the sheep, owing to the dry season (1826), had been considerably stinted in their food in the summer-time, and that they had been, about a month before I saw them, turned into a field of very fine turnips. The appearance of the sheep was rather strange. For about a minute they would stand motionless, and then, all at once, become quite frantic, dashing themselves on the ground,

and running at every one within their reach. Others would all at once spring from the ground, and fall down and die.

"I caught one and bled her copiously, which seemed to relieve her much. I then gave her a dose of Epsom salts, which, in a few days, produced a cure; and by such simple treatment many of the sheep recovered. In those that died, the lungs were very much congested, and the vessels of the brain turgid; and, in some cases, rupture had actually taken place, for there was an effusion of blood on the surface of the brain.

"The flock was immediately removed from the turnip-field, and turnips were given to them more sparingly, and the disease soon disappeared."

TETANUS.

This disease, more commonly known by the name of LOCKED-JAW —because the forcible closing of the mouth is one of the earliest and most prominent, although not the invariable symptom—consists in a constant spasm of the voluntary muscles, and particularly those of the jaw, the neck, and the spine. The symptoms of tetanus in sheep differ materially from those of the horse and of cattle. It generally commences with a singular involuntary spasmodic motion of the head, or of one or all of the extremities, attended by a grinding of the teeth and a fixedness of the jaws. To this succeeds a peculiar stiffness of the greater part of the frame; the neck is protruded and the head bent back, and forcibly retained in that bended form; and one leg is drawn up and fixed in an unnatural position. This rigidness occasionally relaxes, and gives way to violent convulsions of the head, neck, and extremities, followed again by fixidity of them and of the whole frame. The disease runs its course most speedily: the animal is often dead within twelve hours from the first attack; or, if he lingers on beyond thirty-six hours, it may be regarded as a pledge of his ultimate recovery.

M. Gasparin relates an interesting case of it, which he had from his friend Professor Gohier, of Lyons: "About one o'clock in the afternoon I perceived one of my lambs standing in a very singular position: all his four quarters seemed to be stiffened—his head was elevated and thrown considerably backward, and he was ready to fall if he changed his posture in the slightest degree. On examining him more attentively, I found that his breathing was laborious, his pulse accelerated and hard, his mouth open in order to enable him to breathe more freely, the conjunctiva inflamed, and the extensor muscles of the head, the neck, and shoulder, spasmodically contracted.

"At three o'clock the muscles of the jaw were nearly fixed, and the force of the spasm increased every minute, until the death of the animal. The poor creature frequently uttered a peculiarly plaintive sigh.

"At ten o'clock, if he was touched, however gently, the muscles of the extremities would be violently convulsed for one or two minutes, and he would fall. At two o'clock, on the following morning, the breathing was sadly laborious, and could be heard at a consider-

able distance; and this continued until six o'clock, when he died. The rapidity of this disease is very remarkable. As to the cause of it, the only thing that was known was, that he had been exposed during a considerable time to a violent rain; but two other lambs were also thus exposed, and escaped."

The rain was the cause of the disease in this case. Thousands of ewes after lambing, and tens of thousands of lambs lately dropped, are lost every winter by careless and unfeeling agriculturists. It is not a great deal of attention that these animals require. A linney or shed, a few clumps of trees, or even a thick hedge to break the force of the wind, would render them in a manner comfortable; and certainly would remove very much of the danger: but when they are left altogether unprotected, nothing is more common than, after a cold night, to find some of the ewes and more of the lambs dying or dead. In travelling over some of the more open parts of the country on a winter's morning, the author has seen, in the space of twenty or thirty miles, more than as many sheep or lambs stiffened by the cold.

About weaning-time tetanus is also very prevalent, and the old shepherds pretend to foretell what lambs will fall victims to it after castration. If, when the operator is sawing through the spermatic cord with his blunt knife, or gnawing it asunder with his teeth, the jaws of the little animal are strongly and spasmodically clinched, he says that that lamb is in danger of locked-jaw; and, in order to prevent its occurrence, he thrusts his thumb into the mouth of the sufferer, and forcibly separates the jaws. Hurtrel d'Arboval laughs at this; but there is some good sense in it. The spasm is interrupted —the charm is broken, and the disposition to this excess of muscular action is got rid of before it has had time to establish itself generally. Rams are far more subject than horses to tetanus after castration, and especially in some parts of continental Europe, where the operation by torsion *(bistournage)* is often performed with unnecessary severity.

The indications of cure are the same in the sheep as in the horse and cattle. A bleeding from the jugular or from the eye vein, and from the first rather than the second, should be immediately effected; and, before the jaw becomes thoroughly fixed, one or more doses of the castor-oil mixture (see MEDICINES) should be given: it combines the purgative and the anodyne, which such a case requires. Some persons administer aloes or Epsom salts, and, after that, repeated doses of the well-known compound the calves' cordial (see MEDICINES). The object sought to be accomplished is the same, but the opiate should at least speedily follow the purgative. The castor-oil mixture is far preferable.

Tetanus is a far more manageable disease in the sheep than in the horse or the ox. Thousands die because nothing is done; but the animal having been bled—the bowels having been opened—an opiate having been administered—the lamb having been put into a warm bath, and then tolerably dried and wrapped in blankets if the case is usually bad, and at all times being placed within the influence of

but not too near, the fire—and a little gruel, mingled with ginger and ale, or even the housewife's gin, having been given—a cure will often be effected.

CHAPTER VIII.

General Diseases of Sheep.—Remedies.—Mode of Management.

EPILEPSY.

Tetanus and epilepsy may be regarded as kindred diseases in all animals, but in none do they so closely assimilate to each other as in the sheep. Tetanus in sheep seems to be but a little more than an aggravated state of epilepsy. On a sudden, and without any apparent cause, a sheep will cease to graze—he will stare stupidly in every direction, stagger, run round three or four times, and then fall and struggle violently for several minutes.

These sudden attacks oftenest occur in young sheep in good condition, and after sudden and improvident change of pasture. They are frequent in the beginning of spring, and more so toward the latter part of autumn, when the hoar-frost lies thick on the ground. The sheep, either not having been folded, or being dismissed from the fold too early, gather a considerable quantity of this congealed water with their food, and it palsies the action of the rumen, impedes the circulation of the blood through it, and determines the blood to other and more important parts, and among them the head.

Pasturage and condition are probably the main agents in the production of this disease.

PALSY.

This disease, which consists of a partial or total suspension of nervous influence on the muscles of voluntary motion, is not of so frequent occurrence in sheep as in oxen. This disease is very liable to occur to the young lambs just dropped, if exposed to the cold. It is then naturally weak, or, if strong, suddenly exchanges the temperature of the mother's womb for one below the freezing point, and lies for hours on a bed of snow—and the lamb becomes palsied, and perhaps never entirely recovers.

There is a little art in treating these poor palsied beings, and particularly the young ones; for although they resist the cold longer than the adult animal, they have not strength to bear the reaction which often follows when the vital heat begins once more to be produced. The means of relief are simple, but they should be cautiously applied. The little patient should be put into a hamper and carried home, wrapped up in straw, and thus the scanty portion of warmth which continues about him will not be dispersed. After a while, he may be brought into a warm room, or placed at some distance from the fire: a little warm gruel may be administered, with some ginger;

or if he does not soon begin to rally, a little ale may be added to the gruel. Nothing stronger should by any means be allowed. Moderate warmth is the principal restorative. As soon as the lamb begins to recover, and is able to toddle a little about, he should be returned to his mother, who, in the meantime, should have been removed to a more comfortable place; and her care of him, and her milk, will in most cases gradually accomplish a cure.

It often happens, however, that after the palsy of the limbs has disappeared, the digestive organs imperfectly discharge their functions. Diarrhœa—and of a kind difficult to arrest, and soon assuming a serious character—is a frequent consequence of this exhaustion. The best, and, indeed, the only safe and efficacious remedy, is the "sheep and calves' cordial," the composition of which will be found in the list of medicines at the end of this work.

Two or three months afterward comes another dangerous season as it regards the lambs—the time of weaning; and especially if the weather should be cold. They are often turned into some distant, and, perhaps, upland pasture, in order that the mother and the young ones may be out of the hearing of each other's bleating; and that the food may not be too plentiful or stimulating until the lamb is somewhat accustomed to his new kind of nourishment. Notwithstanding every precaution, purging will often come on, and cold will be taken, and there will be weakness of the limbs generally, and especially of the hind limbs, and an approach at least to palsy, if not the actual disease. Possibly this may be somewhat connected with, or consequent upon, the state of almost abandonment in which they were left when newly dropped. The treatment in this case is very simple. If the weather or the locality demand it, they should be placed in a more comfortable situation—a purgative consisting of Epsom salts, with ginger, should be administered—and, after that, a dose or two of the "cordial" will usually set all right.

DISEASES OF THE SENSES.

The organ of smelling in sheep is acuter than in most other animals, but the farmer has often to deplore that want of discrimination between wholesome and poisonous food, which has caused considerable destruction in his flock. Nature gave to every animal the power of distinguishing one plant from another by its scent; but it was left to the tuition of the mother, to a very great extent at least, to teach the young one what peculiar smell, or want of smell, designates a wholesome plant; and what as plainly marks an injurious one. For a while the lamb subsists entirely, or almost so, on its mother's milk, and nature designed that it should be accustomed to its after-food by her side and under her tuition. If, from ignorance, caprice, or because the farmer thinks he can bring his lambs, or their mothers, earlier to the market, he separates the one from the other, and turns out his young stock, inexperienced and untaught, they will eat indiscriminately of every herb that presents itself, and many of them will be lost; and he must take the consequence of his folly or his avarice. This is a point of agricultural economy not sufficiently attended to.

The eyes are protected by lids of a similar construction with those of other animals. An œdematous state, or swelling of the lids, is one of the indications and accompaniments of the rot. If, however there should not be the few enlarged, pale, venous blood-vessels in the inner corner of the eye which uniformly attend the early stages of the rot, this may be a mere local affection, and a few applications of weak camphorated spirit will generally remove it.

Inflammation and soreness, and enlargement, and sometimes ever sion of the tarsi, or edges of the lids, will be the accompaniment or the precursor of scab. It is rare to see confirmed scab without sore eyes, and sore eyes are almost invariably followed by scab. The proper constitutional means and local applications must be resorted to in order to cure this disease; but a weak solution of the sulphate of zinc may be applied to the lids.

From the same cause, and at the same time, the eyelashes are apt to fall off. Any weak mercurial ointment, or lard with a twentieth part of calomel, may be applied in this as well as in the former case, in order to cure the scorbutic affection, and to prevent the lids from adhering together. Should a scabby eruption, beginning on or about the lids, spread over the face, it is akin to, or is a species of scab, and resort must be had to the mercurial ointment considerably lowered. When the bulbs or roots of the eyelashes have participated in the superficial disease, and have been destroyed, as is too often the case in scab, the surface may be healed, but the hair will never grow again: but when, although the lashes have fallen, the bulbs remain uninjured, a little oil or emollient ointment may be applied to prevent adhesion between the lids, and nature will restore the hair without the interposition of art.

Warty tumors occasionally form on the eyelids, and particularly on the upper lid. When they are small they should be touched a few times with the lunar caustic. If they are larger, they may be snipped off with a pair of scissors, and the caustic applied to the root. When neglected, they are apt to degenerate into tumors of different kinds, and that will attain a very considerable size.

GLOSS-ANTHRAX, OR BLAIN.

Sheep are liable, although not so much as cattle, to that inflammation of the tongue, or rather of the cellular tissue on the side of and under the tongue to which the above singular names are given. A few sheep in the flock are occasionally attacked by it, or it appears under the form of an epidemic. A discharge of saliva runs from the mouth; at first colorless and devoid of smell, but soon becoming bloody, purulent, and offensive.

The head and neck begin to swell, and the animal breathes with difficulty, and is sometimes suffocated. A succession of vesicles have risen along the side of the tongue—they have rapidly grown —they have broken—they have become gangrenous—they have formed deep ulcers, or deeper abscesses, that occasionally break outwardly.

The cause is some unknown atmospheric influence; but the sheep

nave been predisposed to be affected by it, either by previous unhealthy weather, by feeding on unwholesome herbage, or by unnecessary exposure to cold and wet.

Whatever may be the case with regard to cattle, there is no doubt that the blain is often infectious among sheep. The diseased sheep should immediately be removed from the rest, and placed in a separate and somewhat distant pasture.

The malady must first be attacked locally. If there are any vesicles in the mouth they must be freely lanced. If any tumors appear on the neck or face, and that evidently contain a fluid, they must be opened. The ulcers must be bathed with warm water at first, and until the matter is almost evacuated—then lotions of cold water, in each pint of which one dram of the chloride of lime has been dissolved, must be diligently used. Aperients must be administered very cautiously, and not at all, unless there is considerable constipation. The strength of the animal must be supported by any farinaceous food that it can be induced to take—linseed mashes—bran mashes with outmeal—and the best succulent vegetables, as carrots and mangel-wurzel; plenty of good thick gruel, if necessary, being horned down, and two drams of powdered gentian-root and one of ginger, with four grains of powdered cantharides, being given morning, noon, and night. Bleeding will be very proper in this disease before the vesicles have broken, or the external tumors begun to soften, and there is an evident and considerable degree of fever but after the purulent, fetid matter has begun to appear, it wil only hasten the death of the animal.

APHTHA, OR THRUSH.

No English writer on the diseases of sheep has noticed this complaint; yet the shepherd has often observed it, and it has probably existed when he was unconscious of it or of its nature. A sheep is dull, and off his feed—he ceases to ruminate—he wanders about unhappily—he sometimes thinks of browsing, and attempts it, but after a feeble effort he gives the matter up. If he had been watched a little more closely, several small vesicles would have been found in his mouth, and a slight discharge of viscid saliva would have been seen. There is very little or no danger about this; but it teases the sheep for a while, and takes him off his food, and gets him a little out of condition. The mouth being washed two or three times with a weak solution of alum, or diluted tincture of myrrh, and a couple of ounces of Epsom salts being administered, the eruption disappears.

There is often a curious coincidence between thrush in the mouth and foot-rot, when the latter has run to ulceration and fetid discharge. Possibly the sheep may have rubbed the deceased foot with his muzzle, or he may have licked it, and the mouth has become filled with vesicles; or it would almost seem that there is a connexion between thrush and foot-rot. The sheep with foot-rot should be carefully watched, and if they refuse to feed—if a ropy saliva runs from the mouth—they should be examined, and the simple and effectual remedy already stated applied.

There is a disease known as the "black-muzzle," a pimpled or scabby eruption about the nose of the sheep, sometimes extending up to the eyes and ears, encircling the former and covering the latter. The application of a little mercurial ointment very much lowered with lard, or the common sulphur of ointment with a twelfth part of mercurial, will speedily effect a cure.

THE SALIVARY GLANDS.

Inflammation of the parotid gland is of frequent occurrence in the ox. There are few cases of severe catarrhal affection, and none of influenza, in which a swelling of the head and neck is not an early and a prominent symptom; and it is always dreaded because, although sometimes manageable, it is a sure indication in these animals that the disease is, or may soon become, of a typhoid character. It does not so often attack the sheep; and when it does appear, if the wool is carefully parted in two or three places, in the space between the angle of the jaw and the neck, and a strong hartshorn liniment (composed of two parts of hartshorn and one of sweet oil) is well rubbed in, and two ounces of salts administered, the inflammation will disappear.

OBSTRUCTION IN THE GULLET.

Occasionally, but not so often as in cattle, portions of food too large readily to descend the gullet, are attempted to be swallowed, and the animal is in danger of suffocation from the pressure of the substance on the windpipe. The sheep is much more readily manageable than the cow. Every sheep-master who uses turnips as an article of food for his flock, should have a small leathern probang with a cane stilette. The sheep in whose gullet there is any obstruction should be placed on its haunches, with its shoulders firmly held between the knees of the shepherd. Then, almost without assistance, or very readily by the aid of an assistant, he can pass the probang with its stilette into the gullet, and, with equable, and sometimes firm pressure, force the obstructing body along. If he can not readily effect this, he should not have recourse to much violence, but pour a little oil into the throat, and then, pressing on the gullet immediately below the obstruction, by gentle or firm manipulation, endeavor to cause its return. If he is foiled in this attempt, he must never have recourse to brutal violence. He may, by main strength, force the potato or the turnip into the rumen, but he will probably lacerate the gullet, or induce a degree of inflammation that must be fatal. Let him clip the wool from the part, and all round the neck; and then, with a scalpel cut down upon the seat of obstruction, and take out the impacted body. Two or three stitches should then be passed through the œsophagus, the edges of the wound in it being brought neatly together. The same must be done with the external skin, the ends of the threads which closed the œsophagus being brought through the outer wound. The neck should then be bandaged, but not too tightly; and the wool above and below will keep the bandage firm. The sheep must be kept on gruel or mashes for

a few days, or until the wound is closed; the stitches being removed as soon as the edges of the wound plainly adhere. This is the most simple of all operations, and will rarely be productive of any unpleasant consequences: the probang, however, should always be first and fairly tried.

THE PROPER FORM OF THE CHEST AND BELLY.

This will be a convenient place to consider the most profitable form of the chest and belly, through the former of which, containing the heart and the lungs, the gullet passes in order to reach the latter, in which the stomachs and other organs of digestion are found. The bony walls of the chest consist of the dorsal portion of the spine above; composed of 13 vertebræ, or bones of the back—(See a cut of the skeleton)—the horse has 18. The latter requires length of carcase for the insertion of more powerful muscles, on the action of which his speed depends.

From each of these vertebræ arises an upright bone, likewise for the insertion of muscles connected with progression, and also for the ligament extending from the poll along the back, and by means of which the head is supported. The head of the sheep is proportionally less bulky than that of the horse, and it is not often that great and continued speed is required of him. Therefore, if this part of the skeleton of the sheep is compared with that of the horse—it will be seen that, while there is a considerable elevation of the withers in the horse, and which is accounted a valuable point in him, there is scarcely any in the sheep; and it would be reckoned a bad point in him, because it would indicate largeness and weight of head, and accumulation of flesh in the least valuable part of the carcase, and would be invariably accompanied by a narrow chest, incompatible with disposition to fatten readily. Therefore it is a principle, slow in being acknowledged when the Leicesters were beginning to struggle with the old breeds, that the back should be, as nearly as possible, straight from the rump to the neck, or, rather, from the rump to the poll. The upright bony processes at this part are short, thick, and irregular on their surface, in order to give firm attachment to such muscles as are requisite, and thus compensate for their deficiency in length.

The ribs are also thirteen in number on each side; and the slightest inspection of a well-formed sheep will show how much more horizontally they spring from the spine than do those of the horse, or even of the ox: and, consequently, the greater roundness and capacity of the chest. On the roundness and capacity of the chest depend the size and the power of the important organs which it contains —the heart and the lungs: and in proportion to their size is the power of converting food into nourishment. "An animal with large lungs is capable of converting a given quantity of food into more nourishment, and, therefore, has a greater aptitude to fatten." On this account the horizontal projection of the ribs from the spine, the consequent roundness and greater capacity of the chest, are reckoned among the most important points of the sheep. In order to com-

plete the rotundity of the chest, and, with that, its greatest possible capacity, the breast-bone is not narrow and deep, as in the horse, but of considerable breadth. In the young animal it is composed of seven distinct portions, united by cartilage; but as the sheep advances to maturity the cartilage disappears, and the sternum is made up of one continued bone. This width of the floor of the chest accounts for the forelegs of the well-formed sheep standing so far apart from each other.

From the front of the sternum is a projection not seen in the horse, or rather occupying the situation of the prominent convexity, *the cariniform cartilage* in the horse. It is partly cartilaginous, but more muscular and cellular, and fatty, extending between the forelegs of the animal in a horizontal direction, and termed *the brisket*. It is justly reckoned a very important point in the sheep, although it is never proportionally so much developed as in the ox; for the animal that will accumulate much flesh and fat about the brisket, will not be deficient in other parts. There is a joint between the brisket and the proper breast-bone, which permits a lateral motion to the right or the left, and allows the free progression of the animal notwithstanding the protrusion of the sternum.

The horizontal projection of the ribs from the spine secures a certain capacity of chest; but there is another point to be taken into consideration, namely, depth as well as width of barrel. It is true that a deep chest is not capacious unless it is proportionally broad but when we have the superior projection of the ribs, and the inferior width of the breast-bone, nothing more is necessary to form a chest most favorable to the speedy acquirement of condition, than tolerable depth of carcass. What was the cause of the disinclination to fatten—the almost impossibility of fattening until they were of a considerable age, in the old breeds, but partly the diminished projection of the ribs above, and, more than this, the apparent length of the legs, or, in other words, the want of depth in the carcass—the want of room for the organs to propel and to animalize sufficient blood to secure the rapid growth of the animal.

The stomachs and intestines are found more posteriorly. The stomachs are exceedingly bulky in the sheep, and they too must have room to discharge their function. Nature has made provision for this, for the loins of the sheep—the transverse processes of the lumbar vertebræ—are proportionally much wider than in the horse, and somewhat wider than in the ox. This secures plenty of space in the roof of the abdominal cavity at the anterior and central part. The evident projection of the hip-bones, while it gives room for the development of the fœtus, and secures the fulness of the hind quarters —the most valuable part of the sheep—likewise contributes to the capacity of the belly in that direction. The springing of the posterior ribs gives roundness to the sides, and the appendix to the breast-bone, prolonged behind, and the thickness and power of the abdominal muscles, give strength to, and preserve the natural form of, the floor of the belly.

Next in importance to the continued straight line of the back, and

chest, and the roundness of the sides, and the filling out at the flanks, is the level line of the belly below. A pot or tub-belly may seem to give somewhat more room, but indicates weakness of the muscles of the abdomen, and an inability to afford its contents that support and pressure which are necessary for the proper discharge of the digestive functions; and, worse than all, a tendency to increase of offal at the expense of the more valuable parts.

THE NECK.

The form of the neck ought to be closely studied by the sheep-breeder, for it is one of "*the points*" of the sheep. It is true that, in order to support the weight of the head, the muscles are large and strong compared with those in the human being; and, if the legs are long, the neck also must be lengthened, in order that the head may reach the ground. The necessity of extraordinary bulk of muscle about the neck is, however, obviated by the employment of an elastic ligament, commencing at the back of the head, attached to every bone of the neck, and continued down to the spinous processes of the back, and inserted there; and by means of which so much of the weight of the head is taken from the muscles of the neck, that they have little more to do than to turn the head from side to side, and move it, within a very limited range, upward and downward.

This, then, being the case with regard to the weight of the head, and the legs having been considerably shortened by careful attention to this object in breeding, the large, thick, long neck of the old sheep is no more to be seen; but one, most certainly full and broad at its base, as being then necessarily accompanied by a round, capacious chest, in which the heart has full room to beat, and the lungs to heave, and gradually tapering toward the head, and being particularly fine at the junction of the head and neck. It also, in well-formed animals, seems to project straight from the chest, so that there is, with the slightest possible deviation, one continued horizontal line from the rump to the poll. The advocates for a thick and a thin neck, are both right to a certain degree It should be thick toward the shoulder and chest, in order to obtain thickness of chine and capacity of chest—it should be light toward the head in order to avoid that coarseness of form which is altogether inconsistent with kindly disposition to fatten. The drooping neck—the ewe-neck—is rarely or never connected with the quick accumulation of outward fat; it is usually an indication of weakness of condition, and, although not the first, is one of the most unerring proofs of deterioration.

HOOVE, OR DISTENTION OF THE STOMACH BY GAS.

This disorder arises from the fermentation and decomposition of food in the stomach, attended by the extrication of a considerable quantity of gas, in which carburetted hydrogen is the prevailing principle.

There are certain kinds of food more disposed than others to this fermentation, and of which the sheep are particularly fond. Fur-

nips, clover, and fresh eddish, are fruitful sources of hoove, when the sheep are incautiously turned on them, or suffered to remain on them too long. The superior quantity of nutritive matter and juices which they contain require that they should at first be taken in small quantities, until the animal becomes accustomed to them.

In early stages of the hoove, gentle exercise would be beneficial, but generally the shepherd has recourse to the knife. He plunges it into the left flank, a little below the chine, and half way between the haunch and the ribs. The gas will immediately rush out, and the wound close in a few days, without injury to the animal. The sheep, however, will not generally do as well as before the disorder, to which it will be again liable: it ought, therefore, to be sent to the butcher.

LOSS OF CUD.

Lambs, while they are supported entirely by the milk of the ewe, or by that of a foster-mother, do not ruminate; but this process commences as soon as the animal begins to take any solid food. The milk passes at once into the fourth or true stomach, in the sucking lamb, and the rumen is not at all used, and is small in size compared with the fourth stomach. A month afterward, if the lamb has been permitted to follow its dam to the pasture, the habit of rumination will have been for a considerable time established, and the rumen will be more than twice as large as the fourth stomach.

The act of rumination is partly a voluntary and partly an involuntary one. It can be suspended, for a while at least, during the pleasure of the animal: and, when he chooses, it may be resumed. In a state of health, however, and the paunch having been filled, and its contents sufficiently macerated, he probably can not easily, or perhaps at all resist the disposition to ruminate. There is not a more unerring symptom of disease, either confined to the digestive organs, or pervading the whole frame, than the cessation of rumination, or "the loss of cud," as it is generally called. It is not so often observed in the sheep as in the ox, for the latter is more under the inspection of the owner; but it exists quite as frequently. As soon as it is observed, the sheep should be separated from the flock, and carefully watched and examined. The loss of cud can not, perhaps, be termed a disease, but it is a symptom of disease, and that either of an inflammatory or debilitating nature. The mode of treatment will depend entirely on the disease that is discovered or suspected; the cause being removed, the effect will cease. It may, however, occasionally happen that the malady is very obscure. Its nature and its seat may be doubtful. Two ounces of Epsom salts, with a dram of ginger, may, in either case, be administered with great propriety. It can not do harm, whatever may be the real complaint, and it will often restore the tone of the stomach and of the system.

DISEASES OF THE LIVER.

Oxen and sheep are more exposed to diseases of this organ than is the horse, from the proportionate greater development of it and the

excess of secretion from it. *Inflammation of the liver*, chronic or acute, not only is the foundation or the forerunner of rot, but, in its simple state, is not of unfrequent occurrence, and is very fatal. The sheep hangs his head, is dispirited, partly or entirely refuses his food, heaves at the flank, is unwilling to move, and the bowels are usually costive. These are symptoms of common fever; but if to them are added yellowness of the skin and of the membrane of the eye, tenderness when pressed on the right side, and *lameness of the right fore-leg*, it is plainly enough inflammation of the liver. The prevailing cause is excess of nourishing food, arising from too great haste to prepare the animal for the market. In many of the fatted and prize sheep that are destroyed by that murderous disease so conveniently termed *inflammation*, the seat of the mischief was the liver, as is plainly enough indicated by the engorgement, and friable, broken-down texture of that organ. Marshy grounds that may not absolutely produce the rot are too frequently the cause of inflammation of the liver. Bleeding, Epsom salts, and spare diet, will be the most effectual means of cure. Sometimes inflammation of the liver appears as an epidemic among sheep. In several parts of France, and particularly in Holland, this has been observed. In both places they give salt to the sheep, both as a preventive and a cure. It is mentioned by no English author; but if the farmer will observe the early symptoms of that illness in his sheep, which so far takes on the character of rot, that the patient pines away to a skeleton, and after death is found to have an enlarged liver, with numerous flukes in it, he will suspect that in the early stage the disease was pure inflammation of the liver, and that he might have saved his sheep had he adopted the proper means.

A visit to the slaughterhouses will show that small calculi often exist in the gall-bladder of the sheep; but the author is not aware of any symptoms which indicate their existence, or of any disease that has certainly accompanied them.

THE ROT.

This disease is classed among those of the liver, because, except when the animal dies perfectly worn out by the malady, the most striking and the supposed characteristic mischief is found in this organ.

So far as the author has been enabled to ascertain, more than one million of sheep and lambs die in every year from this disease. In the winter of 1830–'31, this number was far more than doubled; and had the pestilence committed the same ravages throughout the kingdom (of Great Britain) which it did in a few of the midland, eastern, and southern counties, the breed of sheep would have been in a manner extirpated.

This disease is not peculiar to England. Many sheep are destroyed by it in Germany. In the north of France they are frequently swept away by it; and in the winter of 1809, scarcely a Merino in the whole of that kingdom escaped. It is destructive as far in the north of Europe as Norway; and even the most southern provinces of

Spain have had occasion to mourn its ravages. It has thinned many a flock in North America, and in Van Diemen's Land and Australia it has occasionally been as destructive as in the worst undrained land in England.

It has existed from the earliest period of medical and agricultural history. Hippocrates gives a very faithful account of it, erring only in considering the flukes as hydatids; or rather his attention was confined to the hydatids which are frequently found in the liver of these sheep. In various periods of English history accounts are given of its ravages; and the description of it by our earliest agricultural writers corresponds with what we see of it at the present day.

The early symptoms of rot are exceedingly obscure: this is much to be deplored, because in the first stage of it alone does it often admit of cure. The animal is dull, lagging behind his companions—he does not feed so well as usual. If suspicion has been a little excited by this, the truth of the matter may easily be put to the test; for if the wool is parted, and especially about the brisket, the skin will have a pale yellow hue.

The eye of the sheep beginning to sicken with the rot can never be mistaken: it is injected, but pale; the small veins at the corner of the eye are turgid, but they are filled with yellow serous fluid, and not with blood. The caruncle, or small glandular body at the corner of the eye, is also yellow. Farmers very properly pay great attention to this in their examination or purchase of sheep. If the caruncle is red, they have a proof which never fails them that the animal is healthy. If that body is white, they have no great objection or fear—it is generally so at grass: but if it is of a yellow color, they immediately reject the sheep, although he may otherwise appear to be in the best possible condition; for it is a proof that the liver is diseased, and the bile beginning to mingle with the blood. There is no loss of condition, but quite the contrary, for the sheep in the early stage of rot has a great propensity to fatten. Mr. Bakewell was aware of this, for he used to overflow certain of his pastures, and, when the water was run off, turn those of his sheep upon them which he wanted to prepare for the market. They speedily became rotted, and in the early stage of the rot they accumulated flesh and fat with wonderful rapidity. By this manœuvre he used to gain five or six weeks on his neighbors.

It may be easily conceived that a small increase in the quantity and stimulating property of the bile, which would be the result of nascent inflammation of the liver, would increase the propensity to fatten. This would last but a little while, for the digestive organs would not long bear an excess of stimulus. They would be exhausted by their temporary increase of action; and wasting, more rapid than the previous augmentation of condition, would be inevitable. Bakewell was on the watch for this, and, the moment when the digestive powers were beginning to be impaired, his sheep were sent to the butcher. It was, after all, an unnatural state of condition into which the animal was brought. The muscular fibre was paler, and approaching to yellow; and the fat was flabby. The meat was ten

der, and perhaps would please certain epicures; but it had not the firmness nor the flavor of mutton honestly fattened, and probably was not quite wholesome.

As the disease becomes confirmed, the yellow tinge begins to spread; the muzzle and the tongue are stained; the animal is more dull and dispirited; his false condition rapidly disappears; the membrane of the nose becomes livid; the tongue gradually assumes the same character; the eyes are dull, and their vessels charged with a yellow-brown fluid. The breath now becomes fetid; the bowels variable—sometimes costive, and at other times loose to a degree that defies the power of medicine; the skin often becomes spotted with yellow or black; the emaciation is more and more rapid; the general fever increases; the vessels of the eye are more distended and red; the caruncle is considerably enlarged; the skin becomes loose and flabby, and if it is pressed upon, a peculiar crackling sound is heard; the wool comes off when pulled with the slightest force; the appetite entirely fails; the belly begins to enlarge: on pressure, fluid is easily recognised within it, and hence one of its names, "the hydropic," or dropsical rot. The animal is weak in every limb; a violent purging is now very frequently present; the sheep wastes away to a mere skeleton, and at length he dies—the duration of the disease being from two to four or six months. At some uncertain period of the disease there is an œdematous swelling on the upper part of the throat from an infiltration of fluid into the cellular substance of that part. The sheep is then said to be *chockered;* and from this swelling the disease is sometimes called *the watery poke.*

When a rotted sheep is examined after death, the whole cellular tissue is found to be infiltrated, and a yellow serous fluid everywhere follows the knife. The muscles are soft and flabby: they have the appearance of being macerated. The kidneys are pale, flaccid, and infiltrated; the mesenteric glands enlarged, and engorged with yellow serous fluid. The belly is frequently filled with water, or purulent matter; the peritoneum is everywhere thickened, and the bowels adhere together by means of an unnatural growth. The heart is enlarged and softened, and the lungs are filled with tubercles. The principal alterations of structure are in the liver. It is pale, livid, and broken down with the slightest pressure; and, on being boiled, it will almost dissolve away. When the liver is not pale, it is often curiously spotted. In some cases it is speckled like the back of a toad. Nevertheless, some parts of it are hard and schirrous; others are ulcerated, and the biliary ducts are filled with flukes. Here is the decided seat of disease, and it is here that the nature of the malady is to be learned. *It is inflammation of the liver.* In consequence of this, the secretion from the liver is increased—at first scarcely vitiated, and the digestive powers are rendered more energetic; but soon the bile flows so abundantly, that it is taken into the system, and the eye, the brisket, the mouth, become yellow. As the disease proceeds, the liver becomes disorganized, and its secretion more vitiated, and even poisonous; and then follows a total derangement of the digestive powers. The whole system sympathizes—ev-

ery viscus of the chest and the abdomen is gradually involved, and the animal exhibits at its death a state of general disorganization which accompanies scarcely any other malady.

The liver attracts the principal attention of the examiner: it displays the evident effects of acute and destructive inflammation; and still more plainly the ravages of the parasite, with which its ducts are crowded. Here is plainly the original seat of disease; the centre whence a destructive influence spreads on every side. Whatever else is found, it is the consequence of previous mischief existing here. Then the first inquiry is a very limited one—the nature of this hepatic affection, and the agency of the parasites that inhabit the liver. Are they the cause or the consequence of disease?

The Fluke—the *Fasciola* of Linnæus—the *Distoma hepaticum* of Rodolphi—the *Planaria* of Goese—is found in the biliary ducts of the sheep, the goat, the deer, the ox, the horse, the ass, the hog, the dog, the rabbit, the guinea-pig, and various other animals, and even in the human being. It is from three quarters of an inch, to an inch and a quarter in length, and from one third to half an inch in greatest breadth.

In the belly, if so it may be called, are almost invariably a very great number of oval particles, hundreds of which, taken together, are not equal in bulk to a grain of sand. They are of a pale red color, and are supposed to be the spawn or eggs of the parasite. Great numbers of the same particles are also found in the biliary ducts. They retain the same form, but they are often of various colors—corresponding, perhaps, with the degree of vitality which they possess, or the time that they have remained floating in the ducts of the liver. They are also found in every part of the intestinal canal; and, from November until April, they may occasionally be seen in the dung of the healthy sheep, and swarming in that of the diseased one, and particularly the rotted sheep.

No difference of sex, has yet been discovered in the fluke-worm, and it is believed to be an hermaphrodite.

There can be no doubt that the eggs are frequently received in the food. Having been discharged with the dung, they remain on the grass, or damp spot on which they may fall, retaining their vital principle for an indefinite period of time. The ova of various animals, larger and smaller, and of every description, like the seeds of plants, retain their vitality during an almost incredible period. They find not always, or they find not at all, a proper nidus in the places in which they are deposited; but taken up with the food, escaping the perils of rumination, and threading every vessel and duct, until they arrive at the biliary canal, they burst from their shells, and grow, and probably multiply. "On killing a sheep," says a writer in the Bath Society Papers, "I examined the viscera carefully, and in some of the passages leading from the liver, and which appeared turgid, I found a whitish, thick liquor, which appeared to be all in motion. On applying a pocket-glass, I found it to contain hundreds of these flukes, which were apparently just hatched, and about the size of mites. These, if the sheep had not been killed

would probably have soon obtained their usual size, and destroyed the animal." Of the existence of the fluke out of the intestines there is no proof, any more than of many other of the entozoa, and nothing can with propriety be positively affirmed of it; but from their being almost invariably found in the livers of diseased sheep, and many other animals, it is highly probable that they have existence out of the body, and either on wet and marshy grounds, or in ponds or rivers. If they have existence there, it is probably in the same form as that in which they appear in the sheep, for it is in their last and most perfect form, that the insects of various characters perpetuate their species.

Leeuwenhoeck, says that he has taken 870 flukes out of one liver, exclusive of those that were cut to pieces, or destroyed in opening the various ducts. In other cases, and where the sheep had died of the rot, there were found not more than ten or twelve.

Then, is the fluke-worm the cause or the effect of the rot? To a certain degree both. They aggravate the disease; they perpetuate a state of irritability and disorganization, which must necessarily undermine the strength of any animal; they unnaturally distend, and consequently weaken the passages in which they are found; they force themselves into the smaller passages, and, always swimming against the stream, they obstruct the flow of the bile, and produce inflammation by its accumulation; they consume the nutritive juices, by which the neighboring parts should be fed; and they impede the flow of the bile into the intestines, by clogging up the ducts with their excrement and their spawn. Notwithstanding all this, however, if the fluke follows the analogy of other entozoa and parasites, it is the effect and not the cause of the rot. The ova are continually swallowed by the sound animals and the diseased; but it is only when the fluids are altered, and sometimes essentially changed, and the condition of the digestive organs is materially impaired, that their appearance is favored, or their multiplication encouraged. They resemble the birds of prey, that hasten the death and the demolition of the fallen deer, but who were not concerned in bringing the animal down.

It is far from certain, that the existence of a few of these entozoa, may not form a part of a healthy constitution, the liver being excited to a more uniform secretion of good bile. An intelligent pupil informed the author, that when in autumn a sheep used to be slaughtered every day, for the use of the harvest-men on his father's farm, and he was accustomed to glean a little instruction by a *post-mortem* examination of every sheep, it was rarely that he found one without a fluke or two. A sheep of better condition than the rest, was sure to have them; and it was only in those that were selected because they were thought to have given indications of approaching aliment that they appeared to be numerous.

The circumstance of the ease with which flukes may be produced in the liver of various animals, affords a strong presumption that they are the effect and not the cause of disease. If a rabbit is fed for a few days only entirely on cabbage, or other watery food, his belly

enlarges, and his muscle and fat waste speedily away. If his food is not changed he speedily dies, with the enlarged liver, of rot, and the flukes which accompany rot. They here plainly accompanied, or were produced by, that derangement of the digestive organs caused by the administration of improper food. The author does not, however, dare to add, what would be a decisive argument, if true, that some sheep die rotten, and no flukes or traces of their ravages are found in the liver. He has never seen the liver of a rotted sheep in which the fluke-worm, or traces of his previous existence in the liver, were not sufficiently plain.

The rot in sheep is evidently connected with the soil or state of the pasture. It is confined to wet seasons, or to the feeding on ground moist and marshy at all seasons. It has reference to the evaporation of water, and to the presence and decomposition of moist vegetable matter. It is rarely or almost never seen on dry or sandy soils and in dry seasons; it is rarely wanting on boggy or poachy ground, except when that ground is dried by the heat of the summer's sun, or completely covered by the winter's rain. In the same farm there are certain fields on which no sheep can be turned with impunity. There are others that seldom or never give the rot. The soil of the first is found to be of a pervious nature, on which the wet can not long remain—the second takes a long while to dry, or is rarely or never so. The first, perhaps, is a sloping ground, from which the wet soon runs—in the level and tenacious soil of the other it remains during many a week or month. "In the parish of Little Gaddesden," says old Ellis, "there is a common just before our houses, that feeds my flock in the summer-time, and the flocks of several other persons. This common has two sorts of situations upon it—some of it lies sloping and the rest lies flat. The part of it next my farm, and where my sheep generally graze, lies mostly on *a hanging*, and they never take the rot there, because the waters run off before they can wet the ground enough to make it dangerous to sheep; while in another part of this common, where it lies flat, a farmer lost thirty of his folding-sheep in one year, out of fifty or sixty in all."

Some seasons are far more favorable to the development of the rot than others, and there is no manner of doubt as to the character of those seasons. After a rainy summer, or a moist autumn, or during a wet winter, the rot destroys like a pestilence. A return and a continuance of dry weather materially arrest its murderous progress. Most of the sheep that had been already infected die; but the number of those that are lost soon begins to be materially diminished.

It is, therefore, sufficiently plain that the rot depends upon, or is caused by, the existence of moisture. A rainy season, and a tenacious soil, are fruitful or inevitable sources of it.

But it is not every kind of moisture that will produce the rot. A meadow by a river-side may afford as safe a pasture as can possibly be wished. There is continued evaporation from the stream, but it produces no rot; and the sheep often bathe their feet in it as they drink, but no harm ensues. The river overflows—the meadow is

during many a successive day, covered with water, and the sheep, almost up to their knees, search for their food amid it. The foundation may be laid for foot-rot; probably for catarrh, or more serious chest affection; but the liver-rot is out of the question.

The water gradually subsides, and the river returns to its natural banks. The superficial soil of the meadow, or its substratum, is formed of tenacious clay, and it remains wet during a considerable time. This damp surface is exposed to the united influence of the sun and air. The farmer knows to his cost how soon the danger then commences, for if he removes not his flock to a drier pasture he inevitably loses a fearful proportion of them by the rot.

There is a pond of water in the field; it is too plentifully supplied with springs to be ever dried, and its banks are gravelly, or naturally or artificially too well clayed, to become wet and poachy. No harm ensues although the sheep daily flock around it to quench their thirst. The owner attempts to drain it, and is probably unable perfectly to accomplish his object. He now has, or at least in wet weather he has, a moist and soft surface, and, as experience will too soon teach him, a most dangerous spot. "A grazier of my acquaintance," says Dr. Harrison, in his valuable "Inquiry into the Rot in Sheep," "has for many years occupied a large portion of an unenclosed fen, in which was a shallow piece of water that covered about an acre and a half of land. To recover it for pasturage, he cut in it several open ditches to let off the water, and obtained an imperfect drainage. His sheep, immediately afterward, became liable to the rot, and in most years he lost some of them. In 1792, the drains failed so entirely, from the wetness of the season, that he got another pond of living water, and sustained in that season no loss in his flock. For a few succeeding years he was generally visited by the rot; but having satisfied himself by experience, that whenever the pit was, from the weather, either completely dry, or completely under water, his flock was free from the disorder, he attempted a more perfect drainage, and succeeded in making the land dry at all times. Since that period he has lost no sheep from the rot, though, until within the last few years, he continued to occupy the fen."

A farmer has upon his estate a plot of ground which he boasts never rots his sheep; and he has another on which he scarcely dares to turn them for a day. There comes a deluge of rain, and he hurries his finest sheep into the upper and safer closes, and is compelled to leave a few in the lower and more dangerous parts. To his astonishment, many of his best sheep perish, and he does not lose one of his worst. The profusion of rain had converted the upper pasture into a moist rotting-ground, and had covered the lower one with water, and so interrupted the development of its destructive property.

Then there is something more than moisture necessary for the production of the rot. The ground must be wet, and its surface exposed to the air; and then the plants, previously weakened or destroyed by the moisture, will be decomposed; and, in that decomposition, certain gases or miasmata will be developed, that can not be long

breathed, or scarcely breathed at all, by the sheep, without producing the rot. The miasmata developed from fenny and marshy situations produce certain disorders in the human being, which principally affect some of the internal viscera. In ague the spleen is the victim; in bilious diseases, the liver. In the rot in sheep the liver is the organ mostly affected; it becomes inflamed, enlarged, indurated—then softened—ulcerated, and prepared to be the residence of the fluke.

Chymistry, even in its present advanced state, will afford no means of analyzing these deleterious gases; and it is a matter of little practical consequence to be acquainted with their constituent principles. Of the source whence they are derived there can be no doubt—the decomposition of vegetable substances from the united influences of air and moisture: the means, however, of removing the source of the evil is, in the majority of cases, practicable and easy.

The mischief is effected with almost incredible rapidity. "A farmer in the neighborhood of Wragby, in Lincolnshire, took twenty sheep to the fair, leaving six behind in the pasture on which they had been summered. The score sent to the fair, not being sold, were driven back, and put into the same field in which the six had been left. In the course of the winter every one of them died of the rot; but the six that had been left behind all lived and did well. There could be no mistake with respect to this fact, as the sheep sent to the fair had a different mark from that of the six that were left at home. The loss of these twenty sheep can only be accounted for on the supposition that they had travelled over some common, or other rotting ground, and there became infected."

The miasmata arising from similar causes, and producing disease in the human species, are capable of being conveyed to a considerable distance without losing their infectious property. It is not only dangerous to live on marshy grounds, but in the neighborhood of them; and there is a great difference in the health of the inhabitants of the adjacent country accordingly as the wind blows to or from the marsh. The minute deviations from health in the domesticated quadruped are not yet sufficiently understood, and indeed have scarcely been studied at all, and therefore it can not be confidently stated that sheep in the neighborhood of rotten grounds enjoy that perfect state of health which they would in other situations; but so far it has been, fortunately for the sheep-master, ascertained, that it is necessary for them to pass over, or probably to graze on rotting ground, in order to become infected to any dangerous extent. A farmer, in addition to other land, had a dry hilly sheep-pasture, which he stocked rather hard. In a hollow place of that pasture was a swampy pond, which was preserved for the sake of supplying the wheel of the thrashing-machine. The farmer, notwithstanding the dry and favorable nature of his sheep-pasture, had occasional losses from rot in his flock: he fenced in the pond, and prevented the sheep from having access to the swampy border that surrounded it, and the rot entirely ceased.

Many of the circumstances connected with this disease now become perfectly intelligible. The rot rarely appears before the close

of the spring, except there is a great deal of wet toward the commencement of the summer; and by the end of November few new cases of it are observable. The grass is too young and vigorous in the early part of the spring to be subject to much putrefaction, and it is only a long continuance of wet weather which can so far injure and weaken it as to cause it to decay and become putrid. For the same reason, in the spring of the year, a flock of sheep may be turned into low ground, nay, into the very water-meadows, without being subject to rot; but if they are turned into the same meadows in the autumn, and especially if they are at all overstocked, they are almost sure to perish. The sheep may be turned into luxuriant pasture at any season of the year, and almost in any weather, and very few of them will become diseased. The surface of the ground is protected by the quantity of the herbage, and although there may be moisture beneath, the air has not free access to the roots of the grass, and the process of decomposition either is not yet up, or proceeds languidly. Let, however, this luxuriant pasture be eaten bare, and the weather and the state of the soil be favorable—the one damp and the other tenacious—and the fatal malady will not be slow in making its appearance. So in a rotting year, if the land is under-stocked, and thus the ground remains protected by the herbage, the loss of the farmer will not be immense; but if the field is overstocked and, consequently, trodden down and poached, the rot will probably assume a most fatal character. If, in addition to the sheep, horses and cattle are taken in to graze, the land will be still more poached, and the disease still more prevalent. The grass is trodden down, broken, and destroyed by the weight of the animals; the water collects in the footmarks; and rot, dependent on the causes already stated, is a necessary consequence.

It is an old observation that on all pasture that is suspected to be unsound the sheep should be folded early in the evening, before the first dews begin to fall, and should not be released from the fold until the dew is partly evaporated. Where the ground is well covered, the early or late folding can be a matter of little consequence, so far as the production of the rot is concerned; but if it is bare, or wet, or spongy, it may be easily conceived that, while this additional moisture is on the ground, the process of vegetable decomposition may be accelerated, and more than the usual quantity of deleterious gas escape in combination with the aqueous vapor.

Floods in the latter part of the summer are generally precursors of considerable destruction from the rot. The meadows, when the waters clear away, must be in the highest degree dangerous. The grass at this time has begun to die, the outer leaves and some of the stalks are perishing—they want only the agency of heat and moisture to run into perfect decomposition. The rain comes, and with it the summer's heat; and the decomposition is rapid, and the extrication of poisonous gases profuse. If the waters are not too deep, the sheep may remain in the meadows until the surface is denuded of water, and probably the heavy rains may for a very little while have rendered the upland pastures somewhat dangerous; but the moment

the water returns to its natural bed, the sheep must be hurried from the destruction which would otherwise be their inevitable lot. "A rotting year of sheep," says the old proverb, "a dear year of corn." That is sufficiently plain: the midsummer flood, for the reasons just stated, must be destructive to sheep, while at the same time it injures and beats down the corn when the wheat is just in flower.

Once more, during a frost the sheep may be turned on the worst ground with impunity. Why? The surface of the ground is locked up, and no evaporation of any kind is or can be going forward; but a thaw presently succeeds, and then another frost, followed by another thaw—"Many a frost and many a thaw betokens many a rotten ewe;" so says another old proverb, and it will be sure to be verified. The frost has killed outright every plant that was beginning to decay, and the sun breaks out, and decomposition at once commences, and with it the work of death.

Then the mode of prevention—that with which the farmer will have most to do, for the sheep having once become decidedly rotten neither medicine nor management will have much power in arresting the evil—consists in altering the character of as much of the dangerous ground as he can, and keeping his sheep from those pastures which defy all his attempts to improve them. The nature of the herbage and the character of the plants which the soil produces, have nothing to do with the development of the rot; it is caused simply by the extrication of certain gases or miasmata during the decomposition of vegetable matter, under the united influence of moisture and air. They are both indispensable. If all unnecessary moisture is removed from the soil, or if the access of air is cut off by the flooding of the pasture, no poisonous gas has existence, and the sheep continue sound. The farmer can not always have his land under water; and the flooding, although it may remove the present evil, yet prepares for its return with accumulated destructive power; but he has the means of taking away the superfluous and dangerous moisture. In the majority of cases he may drain, and with comparatively good effect, almost every acre of suspicious ground upon his farm, and which he is desirous to devote exclusively or occasionally to his sheep. It may be an expensive mode of prevention, but it is the only one, and it is a sure one. If the expense is serious and more than he can well afford, he may leave a portion of his marsh land undrained, and on it he may turn his cattle. Yet he would not be altogether wise in doing this; for, although cattle are not subject to the rot, yet the worm in the air passages would destroy many of his young stock, and the older ones would suffer from moor-ill, and wood evil, and rheumatism, and various other diseases, of far too frequent occurrence on marshy ground.

The kind of drainage that should be adopted is not a proper subject of consideration in this work. The farmer must adapt it to his means, his land, and the facilities which his situation may afford him. He must, however, take care that it is effectual. It would, perhaps, be going too far to say with Mr. Parkinson, and yet he is high authority on practical points, that "there would be no rotten sheep

found even upon the most spongy land in the country, if it were properly drained;" and that "there being rotten sheep on enclosed lands is inexcusable." There are seasons when what is called by the farmers *a jack rot* occurs—that is, a general prevalence of this disease. The rain does not fall sufficiently heavy to overflow the lower and most dangerous ground, but it continues long enough to render the upper and usually safe ground almost as wet and spongy as the other. It may, however, be safely affirmed that in a sheep country, and with dangerous ground in various parts of it, no money would be so profitably expended as that which was devoted to the drainage of the farm.

The account of *the treatment* of rot must, to a considerable extent, be very unsatisfactory. Let it be supposed that, late in the summer or autumn, the farmer begins to suspect that the rot is got among his sheep. If he is a careful observer—if he or the shepherd looks the flock diligently over every morning, the malady may be detected at its very commencement. The serous injection of the eye, the paleness of the vessels of the eye, and of the skin, and the dulness of the sheep, will give sufficient indication. Let it be supposed that the attack is just commenced. What is the condition of the sheep; the distance from the market, and the market price? If the sheep are in good marketable condition, is it not best to dispose of them at once? or, if this is actually the beginning of the disease, shall he try, for a little while, to improve that condition? It is one of the characters of the rot to hasten, and that, to a strange degree, the accumulation of flesh and fat. Let not the farmer, however, push this experiment too far Let him carefully overlook every sheep daily, and dispose of those who cease to make progress, or who seem to be beginning to retrograde. It has already been stated that the meat of the rotted sheep, in the early stage of the disease, is not like that of the sound one; it is pale and not so firm: but it is not unwholesome, and it is covered by certain epicures, who perhaps are not altogether aware of the real state of the animal. All this is matter of calculation, and must be left to the owner of the sheep; except that, if the breed is not of very considerable value, and the disease has not proceeded to emaciation or other fearful symptoms, the first loss will probably be the least; and if the owner can get anything like a tolerable price for them, the sooner they are sent to the butcher or consumed at home the better.

Supposing, however, that their appearance is beginning to tell tales about them, and that they are too far gone to be disposed of in the market or consumed at home, are they to be abandoned to their fate? No; far from it. No very sanguine expectations must be formed of a cure; but many more cures would be effected than are reckoned upon, if the farmer would throw off some of his fatalism, and bestir himself in good earnest in the affair. There are many veterinary surgeons now finding their way into various parts of the kingdom who would render good service here; and those agriculturists would deserve well of their country who demanded the estab-

lishment of a school the instructions given in which embraced the maladies of every domestic animal.

If the farmer slaughters many sheep for the consumption of his family, or if he will listen to the testimony of the butcher, he will be assured that several of those that had been tainted by the rot have recovered their full health and condition without medical assistance —with no assistance from the farmer, except change of pasture—and often with no assistance at all but the renovating power of nature. The scars in every part of the liver in the neighborhood of the gall-ducts, the shrunken appearance of the liver at these spots, its generally diminished size—these circumstances will be sufficient to assure him that although the flock attacked by the rot, and neglected from supineness or abandoned in despair, will usually become sadly diminished in its numbers, the case is not so desperate with him who is resolved to discharge the duty which he owes to himself and his flock.

If it suited the convenience of the farmer, and such ground were at all within reach, the sheep should be sent to a salt-marsh in preference to the best pasture on the best farm. There it will feed on the salt encrusted on the herbage, and pervading the pores of every blade of grass. A healthy salt-marsh permits not the sheep to become rotten which graze upon it; and if the disease is not considerably advanced, it cures those who are sent upon it with the rot.

What kind of pasture are the sheep at present occupying? Is there the slightest suspicion of taint about it? Will the farm afford a dryer, a sounder, and a better? Let them have it without delay —let the most valuable of them be still better taken care of—let them be driven to the straw-yard, or some more sheltered place. By these means let the supply of any more of the poison be effectually cut off; then carefully examine every individual in the flock. Are there any indications of fever—heated mouth, heaving flanks, or failing appetite? Is the general inflammation beginning to have a determination to that part on which the disease usually expends its chiefest virulence? Is there yellowness of the lips and of the mouth, of the eyes and of the skin? At the same time are there no indications of weakness and decay? Nothing to show that the constitution is fatally undermined? Bleed. Abstract, according to the circumstances of the case, eight, ten, or twelve ounces of blood. There is no disease of an inflammatory character at its commencement which is not benefited by an early bleeding. To this let a dose of physic succeed—two or three ounces of Epsom salts, administered in the cautious manner so frequently recommended; and to these means let a change of diet be immediately added—good hay in the field, and hay, straw, or chaff, in the straw-yard.

The physic having operated, or an additional dose perchance having been administered in order to quicken the action of the first, the farmer will look out for further means and appliances. Friction with mercurial ointment on the region of the liver has been recommended, but not by those who have had opportunity to observe its secondary effects on the ruminant. It is used, but then cautiously, and very

much lowered, in order to cure the scab, or other violent cutaneous eruptions, and it must be used cautiously—it must be carefully watched—or, to speedy salivation will be added the breaking up of the whole strength of the constitution. Still, the disease under consideration, with evident determination to the liver, requires the agency of this powerful but dangerous medicine. Two or three grains of calomel may be given daily, but mixed with half the quantity of opium, in order to secure its beneficial, and ward off its injurious, effects on the ruminant.

To this should be added—a simple and a cheap medicine, but tha which is the sheet-anchor of the practitioner here—common salt. Many quack medicines have been obtruded on the public for the cure of rot, and wonderful stories have been told of their good effect. It can not be denied that some of them have been useful; but they have been indebted for most of their salutary power to the salt which they contained, and which the farmer can procure at far less cost, and separated from those deleterious stimulants which, whatever may be their effect in protracting the disease when the powers of life begin to fail, are altogether out of place at the commencement of the complaint.

The farmer is beginning to be aware of the valuable properties of salt in promoting the condition, and relieving and preventing many of the diseases of all the domesticated animals. In the first place, it is a purgative, inferior to few, when given in a full dose; and it is a tonic as well as a purgative. Its first power is exerted on the digestive organs—on the stomach and the intestines—augmenting the secretions, and quickening the energies of each. It is the stimulus which Nature herself points out, for, in moderate quantities and mingled with the food, men and beasts are fond of it. A mild tonic, as well as an aperient, it is plainly indicated soon after the commencement of the rot. The doses should be from two to three drams, repeated morning and night. When the inflammatory stage is clearly passed, stronger tonics may be added to the salt, and there are none superior to the gentian and ginger roots; from one to two drams of each, finely powdered, may be added to each dose of the salt.

The hay, if any is allowed, should be plentifully sprinkled with salt. The sheep will be induced more readily to take it; when, otherwise, the remembrance of their green food might cause them either to eat sparingly of it, or to refuse it altogether.

The use of salt, for general purposes, is no new recommendation. Some of the most ancient Greek writers on agriculture have spoken of it in the strongest terms, but it has never been valued so much as it ought, and in the rot its triumph is most signal and certain.

The sheep, having a little recovered from the disease should still continue on the best and driest pasture on the farm, and should always have salt within their reach. The rock-salt will be the most convenient, and the cheapest, considering the wasting and melting of the common salt; and if it should be necessary, on account of the arrangements of the farmer, again to place them on suspicious ground, the allowance of salt should be ample, or, in fact, unlimited.

It does not appear that one sort of sheep is more liable to the rot than another, but the heavy breeds of sheep, requiring more abundant and grosser food, are oftener placed in situations liable to engender the rot.

After the account which has been given of the nature and treatment of the rot, the questions as to the infectiousness, or hereditary character of the disease, are readily answered. No one who is in the slightest degree acquainted with the subject could for one moment suspect it to be infectious. It results from the breathing of these injurious gases, and from nothing else. Even the previous condition of the animal seems to have little influence in causing or preventing it. As to hereditary predisposition, that too is altogether out of the question. The rot is produced by a cause of merely temporary influence and power. How far, however, it may be prudent to breed from animals that have been affected by the rot, is another question. The rot can not be produced in the offspring by any taint that may be derived from the parents—but the general debility which this malady leaves behind it, and the predisposition to disease of certain viscera, and particularly of the liver, from causes that would scarcely affect other sheep—there is much in this which deserves the serious consideration of the farmer. He will probably conclude that a sheep that has recovered after an attack of this fatal malady should be consigned to the butcher as soon as he is in marketable condition, and that it would be imprudent to breed from any animals that had been attacked by the rot.

One circumstance should not remain unmentioned—it is so with many other diseases, in both the human being and the brute, and it is a wise and kind provision of nature—the ewe with a lamb by her side possesses, with a very few exceptions, an immunity from infection, even on the worst ground.

SHEEP'S DUNG—FOLDING.

Sheep's dung is valuable for manure, and for some other purposes. It has been supposed, and probably with truth, that it contributes more to the improvement of the land than does the dung of cattle. It contains a greater proportion of animal matter, and that condensed into a smaller compass; and it falls upon the ground in a form and manner more likely to be trodden into and incorporated with it, than the dung of cattle. Hence arose the system of folding sheep on the arable part of a farm in many districts in the midland and southern parts of England. The sheep were penned on a small space of ground, and the pens being daily shifted, a considerable quantity of land was ultimately manured. In Norfolk, where the system was more than usually prevalent, it was considered to be a valuable point with regard to the sheep, that they might be driven to a considerable distance in order to be folded.

On the other hand, it is certain that the sheep must suffer in some degree from being driven a mile or two to the fold morning and night, and having their hours of feeding and of rest controlled. The sheep that are so folded do not fatten so well as others, on account

of this additional labor, and on account likewise of the unnecessary exertion during the day, when, collected in large bodies, they are struggling for the lead. The system of folding, therefore, is not so much practised as it used to be on arable land, although often highly beneficial in an unenclosed or down country, and more particularly advantageous when the sheep are turned on turnips, clover, tares, or other rich food, for they feed at their ease, and manure the land at the same time.

ACUTE DROPSY, OR REDWATER.

In treating of the diseases of the belly of the sheep, it will be natural first to consider those of the enveloping membrane of the intestines. It is strangely subject to acute inflammation. In the autumn, or commencement of winter, when sheep are beginning to feed on turnips or other succulent food, the shepherd will perhaps look over his flock in the evening, and perceive nothing amiss with any of them; but on the following morning one or more of them will be found dead. They will be lying in nearly the usual posture, the legs bent under them, and the head protruded: there has not been any severe struggle—but they are dead—and, on examination, the belly contains a greater or less quantity of bloody fluid, and the peritoneum, and especially the mesenteric and omental portions of it, is highly inflamed. Often a change of pasture, and especially from a dry to a cold and wet one, and especially if there is much hoar frost, will be as destructive as an inconsiderate change of food. The animal becomes chilled by this sudden change of situation. The belly, coming most in contact with the damp and cold ground, is first affected. The losses of the farmer in the autumn and winter are often exceedingly severe from this disease. It is generally termed *redwater*, naturally enough from the color of the fluid with which the belly is filled; yet there is an objection to the term from the possibility of its being confounded with the discharge of red-colored urine, to which the sheep is likewise subject.

It is this disease which is so fatal among lambs soon after they are yeaned, when the farmer suffers them to lie about upon a moist and chilling soil. The difference between the temperature of the mother's womb and the cold air that is generally felt at yeaning-time is a sufficient cause of hazardous disease, without the sheepmaster aggravating the danger by incautiousness and inhumanity.

It is probable that no blame may attach to the shepherd on account of his not observing any previous illness, for the progress of the disease is often almost incredibly rapid. It is an instance rarely occurring in the practice of the human surgeon, but very interesting to him, of the rapidity with which this product of inflammation may accumulate in the belly.

In some cases, however, there will be warning of the commencement of the disease. The sheep will lag behind, or separate himself from the flock, or stand with his head protruding, or begin to breathe with difficulty, and the enlargement of the belly inducing suspicion of the real nature of the case. Before the effusion has much pro

ceeded, the animal will evince a great deal of uneasiness, lying down and getting up; sometimes rolling about; occasionally the mucous coat of the intestines sympathizing with the peritoneal, and there being frequent watery stools, mixed with mucus and bile. Oftener, however, there will be obstinate constipation.

In the present imperfect state of our knowledge of the diseases of sheep, and when the symptoms, and the circumstances relating to food and situation, lead to the suspicion of the existence of this malady, the best advice that can be given to the farmer is immediately to slaughter the animal. If any medical treatment is adopted, it must consist of bleeding to a very considerable extent—the administration of purgatives—the change of pasture, or the substitution of more wholesome food.

As for that species of dropsy which is the consequence of debility, or the result of various diseases, it is usually past all cure. It is the almost invariable accompaniment of the rot in its last stages: it follows acute inflammation of the liver, and chronic peritoneal inflammation; it is a symptom, scarcely to be mistaken, of the breaking up of the constitution.

It is a disease very common among old sheep, and at the end of the autumn or the beginning of the winter. Its earliest symptom is swelling of the legs toward night, swelling under the jaw, loss of flesh, and strength, and spirits; then enlargement or hanging down of the belly; and, at length, the detection of the water, by striking the belly with one hand while the other is held firmly on the opposite side.

Gentle purgatives mingled with tonics—the Epsom salts, with gentian and ginger—little watery food, and a liberal allowance of hay and corn, will be the only restoratives. The evacuation of the fluid by the use of the trocar should be intrusted to no one but a veterinary surgeon, and will very rarely afford permanent relief. If the system can not be sufficiently restored to cause the reabsorption of the effused fluid, the relief by tapping will be temporary and delusive

DIARRHŒA.

If these affections of the external coats of the intestines do not frequently occur, inflammation of the inner or mucous membrane is the very pest of the sheep. When it is confined principally to the mucous membrane of the small intestines, and is not attended by much tenesmus or fever, it is termed *diarrhœa;* when there is inflammation of the large intestines, attended by fever, and considerable discharge of mucus, and occasionally of blood, it is *dysentery.* These diseases are seldom perfectly separate, and diarrhœa is too apt to degenerate into dysentery. The diarrhœa of lambs is a dreadfully fatal disease. If they are incautiously exposed to the cold, or the mother's milk is not good, or they are suckled by a foster-mother that had yeaned too long before, a violent purging will suddenly come on, and destroy them in less than twenty-four hours.

When the lamb begins to crop the grass at his mother's side he is

liable to occasional disturbance of the bowels; but as he gains strength, the danger attendant on the disease diminishes. At weaning-time care must sometimes be taken of him. Let not, however, the farmer be in haste to stop every little looseness of the bowels. It is in these young animals the almost necessary accompaniment or consequence of every change of diet, and almost of situation; and it is frequently a sanative process: but if it continues longer than four-and-twenty hours—if it is attended by pain—if much mucus is discharged—if the appetite of the animal is failing him in the slightest degree—it will be necessary to attend to the case. The medicine is that which is sold under an expensive and not always genuine form by the name of the "Sheep and Calves' Cordial." The best way of compounding it is the following: take of prepared chalk an ounce, powdered catechu half an ounce, powdered ginger two drams, and powdered opium half a dram; mix them with half a pint of peppermint-water. The dose is from one to two tablespoonfuls morning and night.

Should the purging prove obstinate, it will be advisable to remove the lamb from the mother, for her milk is probably not good. The milk of another ewe may not be procurable without difficulty; it will therefore be generally expedient to have recourse to the milk of the cow, which should be boiled: the Calves' Cordial being continued as before, and good care and nursing being never forgotten while the animal labors under this disease.

The diarrhœa of lambs is, in a great majority of cases, attributable to the carelessness or mismanagement of the farmer, either referable to deficient or improper food, or the want of shelter at an early age: as the animal grows up, he is better able to struggle with the disease.

Diarrhœa occasionally attacks the full-grown sheep, and is too often fatal, especially when it has degenerated into dysentery. It is very common in the spring, and particularly in the early part of the season, when the new grass begins rapidly to sprout. Here, still more decidedly than with the lamb, the sheep proprietor is urged not too suddenly to interfere with a natural or perhaps beneficial discharge; and after which the animal often rapidly gains condition. Four-and-twenty hours should pass before any decisive step is taken; but if the looseness then continues, the sheep should be removed to shorter and drier pasture, and hay should be offered to them, if, after having tasted of the fresh grass of spring, they can be induced to touch it: a dose or two of the Sheep's Cordial may also be administered with advantage. The looseness not abating, and especially the symptoms of dysentery which have been just described, appearing, another course must be pursued.

DYSENTERY.

The careless observer would not always mark the difference between diarrhœa and dysentery; they are, however, perfectly distinct in their seat, their nature, and their consequences. Diarrhœa is often an effort of nature to expel from the intestinal canal something that offends. It may be only increased peristaltic action of the bowels,

increased secretion from the mucous glands, and accompanied by little inflammation and less danger. It is, at first, an affection of the small intestines alone; but it may extend through the whole alimentary canal—and inflammation, which is not a necessary part of it, appearing, and increasing, general fever may be excited, attended by considerable danger. Dysentery is essentially inflammation of the large intestines—the result of neglected or obstinate diarrhœa, or altogether distinct from it—the consequence of unwholesome food—of being pastured on wet or ill-drained meadows—and of being half starved even there. Fever is a constant attendant on it in its early stages, and wasting and debility rapidly follow.

The discharge of dysentery is different from that of diarrhœa. It is thinner, and yet more adhesive. A great deal of mucus mingles with it, which causes it to cling to the wool of the tail and the thighs; and there it accumulates, layer after layer—a nuisance to the animal, a warning to the owner of much danger, and that near at hand. When this kind of evacuation has been established but a little while, the next warning will be loss of flesh, and that to an extent that would scarcely be deemed credible. The muscles of the loins will all waste away; it is a living skeleton on which the owner puts his hand when he examines the state of the patient. Sometimes the animal eats as heartily as ever; at other times the appetite utterly fails. The continuance of the disease, or the time which is requisite in order to wear the animal quite down, is uncertain. Dysentery occasionally carries off its victim in a few days; but frequently the miserable-looking patient struggles with its enemy for five or six weeks, and dies at last.

It is only lately that the proper treatment of this malady has been recognised. In every case of acute dysentery, and whenever fever is present, bleeding is indispensably requisite; for this is essentially a disease of inflammation. Physic should likewise be administered, however profuse the discharge may be; for it may carry away some of that perilous stuff which has accumulated in the large intestines, and is a source of fearful irritation there, and it will tend to lessen the general fever which accompanies this stage of the malady. The sheep must be removed from that situation and food which perhaps excited, and certainly prolong and aggravate, the complaint. Mashes, gruel, and a small quantity of hay, must be given.

Two doses of physic having been administered, the practitioner will probably have recourse to astringents. The Sheep's Cordial will supply him with the best; and to this tonics may soon begin to be added—an additional quantity of ginger may enter into the composition of the cordial, and gentian-powder will be a useful auxiliary. With this—as an excellent stimulus to cause the sphincter of the anus to contract, and also the mouths of the innumerable secretory and exhalent vessels which open on the inner surface of the intestine—a half grain of strychnine may be combined.

BRONCHITIS.

Lambs, and particularly when too early, and too much exposed, are subject to inflammation of the bronchial passages, indicated by

loss of appetite, tenderness when the throat, or the belly, is pressed upon, and particularly by a *wheezing* cough, which the careful observer will at once distinguish from the ringing one of laryngitis. The Epsom salts, with, in the treatment of the diseases of these youngsters, the addition of more than the usual proportion of ginger, will generally give relief, especially if the comfort of the animal is somewhat attended to.

Bronchitis in young cattle is often accompanied or caused by the presence of worms in the air passages, which are a source of great irritation, and frequently of death. Sheep are far less troubled with these parasites: but several cases have come under the cognisance of the author, in which the air-tubes were filled with them, and the animal destroyed by the inflammation which they set up. This will be suspected when the cough is unusually distressing, and almost continual. Like the same disease in cattle, it is confined almost entirely to low, marshy, woody pastures—and to young lambs and hoggets; and is oftener seen in those that have been neglected and are weakly, than in the well-fed and healthy stock. Occasionally, however, it prevails in dry summers, and on good pastures, when the ponds are nearly dried, and full of animalculæ.

The first, and the most important curative measure consists in removing the sheep from the pasture, of whatever character it may be, on which they become diseased. The medical treatment lies in a small compass; it is the administration of common salt, in doses of $1\frac{1}{2}$ or 2 oz. daily, with 6 or 8 oz. of lime-water, given in some other part of the day. The author is indebted to his friend Mr. Mayor, of Newcastle-under-Line, for the knowledge of this most successful method of treating bronchitis in young cattle, and he has found it quite as successful in sheep.

ACUTE INFLAMMATION OF THE LUNGS.

This is by no means an unfrequent disease among sheep. It is caused by cold and wet pasture—chills after hard driving—washing prior to shearing—shearing during inclement weather, and other circumstances of a similar description. Its first indication is that of fever—hard and quick pulse—disinclination for food—cessation of rumination—unwillingness to move—slight heaving of the flanks, and a frequent and painful cough. To this succeeds a more frequent and distressing cough—a greater disturbance of respiration—a total disgust of food—an oppressed and perhaps intermittent pulse—a discharge of fœtid matter from the nose—a grinding of the teeth—an insatiable thirst, and an eager darting at the food offered, but which is afterward retained in the mouth unmasticated, as if the animal were unconscious of its presence. A short time only passes ere other symptoms follow. The pulse becomes almost imperceptible, the cough is weaker and yet more painful—the flanks convulsively agitated—a crepitus, or pressure on the loins—a nauseous discharge from the nostrils—a staggering walk—a clouded eye—a countenance expressive of suffering and despair. The cough now ceases—the pulse dies away—the animal becomes half unconscious—perhaps

delirium succeeds, shortly after which death closes the scene. Examination after death exhibits the lungs, almost always, gorged with blood, black, decomposed, and lacerated by the slightest touch, and one, or sometimes every lobe strangely increased in bulk, and not subsiding in the slightest degree when the atmospheric air presses upon it. These are the characteristic lesions, but in addition to them are inflammation of almost all the viscera—fullness of the maniplus, distension of the abomasum, and enlargement and softening of the liver.

It is difficult to account for the fact, that inflammation of the lungs in sheep generally takes on this gangrenous character Is it because the animal seems to be destined to the quiet and undisturbed accumulation of fat and growth of wool, and that no provision is made for those disturbances of the respiratory apparatus, and therefore the structure of the lungs is soon disorganized?

If such is the rapid and fatal progress of this disease in sheep, characteristically called by the shepherds, the "rot of the lights," the course of treatment is sufficiently plain. In the early stage bleeding and purging must be carried to their full extent: for by such means alone can a disease like this be subdued. On the other hand, however, the actual state of the patient must be carefully ascertained. Depletion may be of inestimable value during the continuance, the short continuance, of the febrile state; but excitation like this will soon be followed by corresponding exhaustion, and then the bleeding and the purging would be murderous expedients, and gentian, ginger, and the spirit of nitrous ether, will afford the only hope of cure.

CONSUMPTION.

There is another, and still more frequent, and equally fatal disease of the lungs, but it assumes an insidious character, and is not recognised until irreparable mischief is effected, viz., sub-acute, or chronic inflammation of the lungs, and leading on to disorganization of a peculiar character—tubercles in the lungs, and terminating in phthisis. The sheep is observed to cough—he feeds well, and is in tolerable condition—if he does not improve quite as fast as his companions, still he is not losing ground, and the farmer takes little or no notice of his ailment. Perhaps it can hardly be expected that he should; for although it might be difficult, or perhaps impossible, to prepare this cougher for the Christmas show at Smithfield, there is no difficulty in getting him into fair marketable condition.

He is driven to the market, and he is slaughtered, and the meat looks and sells well; but in what state are the lungs; Let him who is in the habit of observing the plucks of the sheep, as they hang by the butcher's door, answer the question. He sees plenty of sound lungs from oxen—he sees the lungs of the calf in a beautifully-healthy state; but he does not see one lung in three belonging to the sheep that is unscathed by disease—whose mottled surface does not betray inflammation of the investing membrane, and in the substance of which there are not numerous minute concretions—tubercles.

Perhaps these lesions quickly follow sub-acute inflammation of the lungs, but they do not rapidly increase afterward. Their existence produces a slight cough, which scarcely interferes with health—nay, it is a matter of question whether the degree of irritation which they produce does not for a while stimulate the lung to an increased discharge of duty, and whether there is not more blood arterialized, and more flesh and fat produced; and therefore in the modern system of grazing, when the sheep is sent to the market, sometimes at eighteen months old, and seldom later than thirty months, this disease, which at a more mature age would destroy the animal, is disarmed of most of its terrors.

This constitutes a material distinction between consumption in the cow and the sheep. In the first animal there is for a time, and often a long time, appetite and condition, and a plentiful secretion of milk; but, for the purpose of breeding and milking, the cow is kept year after year, until the disease is fully established and runs its fatal course: in the other animal the disease is not allowed time to develop itself. But what is the case, and that not unfrequently, with the ram and the ewe when they get three or four years old? The cough continues—it increases—a pallidness of the lips, or of the conjunctiva, is observed—a gradual loss of flesh—an occasional or constant diarrhœa, which yields for a while to proper medicine, but returns again and again until it wears the animal away. How many, in a breeding stock of sheep, perish in this way? Of how many diseases is this cough and gradual wasting the termination. It is the frequent winding up of turnsick; it is the companion and the child of rot.

This disease is especially prevalent in low and moist pastures, and it is of most frequent occurrence in spring and in autumn, and when the weather at those seasons is unusually cold and changeable. It is almost useless to enter into the consideration of treatment. It would consist in a change to dry and wholesome, and somewhat abundant pasture—the placing of salt within the reach of the animal, and, if he was valued, the administration of the hydriodate of potash, in doses of three grains, morning and night, and gradually increasing the dose to twelve grains. With regard, however, to the common run of sheep—when wasting has commenced, and is accompanied by cough or dysentery, the most honest and profitable advice which the surgeon could give to the farmer would be, to send the animal to the butcher while the carcass will readily sell

CHAPTER IX.

Breeding – Managemen. of the Ewe during Pregnancy.—Abortion.—The Preparation for Lambing.—The Lambing.—The Cæsarian Operation.—Care of the Lambs.—Castration.—Docking.—Spaying.—Diseases of the Lambs.—Sorting of the Lambs.

BREEDING—THE GENERATIVE AND URINARY SYSTEMS.

The object of the sheep-master, is to raise and to retain that animal which will pay best for the consumption of its food. With the breeder of cattle, this is a very simple affair—he selects and cultivates that animal which will attain the greatest maturity and weight in the shortest time, and on the least quantity of food. The diary-man wishes to add another quality to the aptitude to fatten, namely, the yielding, and for a considerable time, a large quantity of milk. The sheep-breeder also derives his profit from two sources, the early maturity of the carcass, and the quantity and useful properties of the wool. Both will occupy his attention : the first, in every case, and as his grand object ; the second as valuable, but regarded more as a subsidiary.

How shall he attain these objects ? He looks carefully over his flock, and he observes that some of his sheep—the food and the general management being the same—fatten more quickly than others. There is the same attention paid to all, but the profit is abundantly more from some than from the majority of their companions. He is anxious to account for this. He compares these sheep with some of their fellows, and he observes that there is an evident difference of conformation, a fineness of bone, a roundness and compactness of form, a condensation of substance, and a beautiful proportion of every part. He studies this, and he finds that there is more or less of this conformation in every sheep that materially outstrips his fellows. He inquires farther, and if he has employed different rams, the one that possesses most perfectly this peculiarity of form, and its accompanying aptitude to fatten, was the parent of these promising sheep, or their dam had these points in considerable perfection. He now begins to form some notion of the kind of animal that the profitable sheep should be ; and, he has living proof that these valuable properties may and will descend to the offspring.

His pride and his interest are involved, and he examines these flowers of his flock with still closer attention. He finds that, in the handling, they present as great a difference to the feeling as they do to the eye. There is a softness, a springy elastic softness, in distinction from the hard, harsh, unyielding nature of the skin, and the texture immediately beneath it in others, which once impressed on the mind, can never be forgotten ; and he associates this with the certainty of early maturity.

Having satisfied himself with regard to these things, he dismisses the ram that does not exhibit these qualities, or that fails in getting lambs possessing them ; and the ewes that do not approach to the beau ideal which he has formed in his own mind, or whose lambs are

inferior in appearance or in thriftiness. He fattens these and sends them to the butcher. He collects together the lambs as soon as their form and qualities begin to develop themselves—a little experience will enable him to judge accurately of this at a very early age—and without hesitation he discards those that are not up to the mark, whether ram or ewe-lambs. He puts by a few of the very best of the males for a second examination, at no very distant time, and every faulty one is selected from the ewe-lambs, and prepared for the butcher as quickly as may be. In this way, the flock is systematically and rapidly improved, and the breeder is well repaid for the diligent attention which he has given to this important object. *If his flock is large, he will find in this principle of selection everything that he can want.*

There is one point more, the importance of which he can not overrate—*he should never preserve a lamb that has an evident and glaring defect.* In proportion as his flock improves he should regard this as a rule that admits of no exception; for the principle that "like produces like," extends as powerfully to the defects as to the excellences of the animal. The progeny infallibly inherits the defects as well as the excellences of the parent; and no improvement in a good point, already possessed to a considerable extent, can compensate for the introduction of an obvious blemish.

On this principle of selection the breeder will continue to proceed, if his flock is tolerably large, and he will even be jealous of the introduction of a foreign breed. The good qualities of his sheep, transmitted from one generation to another, are no longer accidental circumstances. They have become a part and portion of the breed, and may be calculated upon with the greatest degree of certainty. They constitute the practical illustration of the term *blood.* It would be long ere the good qualities of a stranger would form an identical portion of the sheep; and no animals will elsewhere thrive so well, or improve so rapidly, as on the pastures on which they and their forefathers have, generation after generation, been accustomed to wander.

But, after a while, with a considerable degree of certainty in a small flock, and too frequently in a larger one, the sheep will continue to arrive early at maturity, and to fatten as kindly as before, or even more so, but they evidently are decreasing a little, and yet only a little, in size. They do not bear the severity of the weather quite so well, and perhaps they are somewhat more subject to disease. The farmer will do well to take warning. He has been breeding too long from close affinities; and he must introduce a little different and yet congenial blood. He must select a ram from a soil, and kind of food, not dissimilar to his own, although at a distance perhaps as great as convenience will permit—with points as much resembling his own sheep as may be—quite as good as those in his own flock—superior if possible in some points, and inferior in none, and he must dismiss his own ram for one year and make use of the stranger. His purpose will be completely answered. He will have infused a tone and vigor among his sheep—they keep their propensity to fatten,

and they reacquire that health and hardiness which they used to exhibit, and the farmer is enabled to go on satisfactory for a certain number of years; when experience will tell him that a stimulus, in the form of a little foreign blood, is again wanted. Thus is illustrated that axiom with regard to all our domesticated animals—"selection with judicious and cautious admixture, is the true secret of forming and improving a breed." The errors to be avoided are too long-continued and obstinate adherence to one breed; and, on the other hand, and even more dangerous, violent crosses, in which there is little similarity between the soil, the pasture, or the points and qualities of the animals that are brought together.

The ewe is sufficiently matured for breeding at fifteen or eighteen months. The old farmers did not employ them for this purpose until after the second shearing: but the improvement in the breed, which develops so soon a disposition to fatten, and prepares them so much earlier for the market, hastens also the development of the generative powers in the sheep.

The ewes and rams being kept in different pastures, the farmer can select his own time for bringing them together, and consequently, the time for yeaning; and that will depend on various circumstances. Where there is a demand for house-lambs, or the farmer adopts the rearing of such lambs as a part of his system of management, the period of yeaning should commence as early as September or October, in order that in November and December the lambs may be ready for the market, and, at which time they will obtain a good remunerating price.

In the general course of breeding, however, it is desirable that the lambs should not fall until the cold of winter is over, and the pasture begins to afford some food for the little ones. This is peculiarly important in bleak and exposed situations. Thousands of lambs die every year from the cold to which they are exposed as soon as they are yeaned. On the other hand there may be some inconvenience and danger if the period of lambing is too late. Hot weather is as fatal to the mother as cold is to the offspring. It frequently induces a dangerous state of fever; and both the mother and the lamb may be then injured by the luxuriance of the grass. If the lamb falls late in the season, it will be longer ere the ewe can be got ready for the butcher, and the ground cleared for other stock—and, in addition to this, the early lambs become larger and stronger, and better able to resist the cold of the succeeding winter. The yeaning time will, therefore, be regulated by the situation of the farm, the nature of the pasture, and the demand from the neighboring markets. It will seldom, however, commence before the middle of March, or be postponed beyond the middle of April.

The duration of pregnancy is about five months or 152 days, and that with comparatively trifling deviation. The time for putting the ram with the ewes will therefore be from the middle of October, to that of November. No preparation is necessary, except, for a few weeks previously, to place the ewes on somewhat better pasture than usual. Before the ram is admitted the farmer should always fold and

examine the ewes, first as to their possessing that form and appearance that are likely to perpetuate the breed which he is desirous to possess, and secondly, to ascertain whether they are in good health, the proof of which will be the whiteness and firmness of their teeth, the sweetness of their breath—the brightness of the eye and of the countenance, the degree of fat which they carry, and the firmness with which the wool adheres to the pelt. Every inferior or diseased ewe should be separated from the rest, and prepared, as speedily as may be, for the butcher.

In consequence of the new system of breeding and management, the ram will be sufficiently matured at the same age as the ewe; but it will not, perhaps, be prudent to allow him so many ewes as would be placed with one of greater age. The number should be somewhat regulated by the apparent health and strength of the animal and the pasture from which he comes. Forty or fifty ewes may be allowed to the sheerling, and seventy or eighty to the older ram. The practice of worrying the ewes with dogs, or employing a teaser, has deservedly fallen into considerable disuse. It was formerly the custom to *raddle* the ram, or rub a little red ochre on him from his brisket to his belly, and repeat this daily for a fortnight. If the marked ewes still continued in blossom and followed the ram, it would show that they had not been impregnated by him, and experience proved that if the first connexion was not successful no other would, generally speaking, be so with the same ram. This ewe would then, probably, be put with another ram, or another ram would be selected to take the place of the first in the ewe-flock.

The ram having been put with the ewes, the owner should visit the enclosure once or twice every day. During the first four or five days the ewes will be seen flocking around him, and following him from place to place; but if this long continues there will be reason to suspect that he is incompetent to his duty, and the owner will probably be disposed to remove him, or to place a younger ram in the same fold with him, who, although he may be persecuted and driven about by the first, will find opportunity to impregnate those ewes with whom the other has failed. At the expiration of the third week, the first ram, whether he appears to have discharged his duty or not, should be removed, and another put in his place. By this means all except the barren ewes will certainly be impregnated.

MANAGEMENT OF THE EWES DURING PREGNANCY.

The rams having been finally parted from the ewes, some little attention should be paid to the latter. They should be driven gently to and from the fold; no dogging should on any account be allowed; they should be separated from the rest of the flock, and, if possible, a sheltered and tolerably good pasture should be allowed them. If the convenience of the farmer requires it, they may have turnips, or mangel-wûrzel, or other green food in the winter; but they must not be suffered to gorge themselves; nor indeed should any food, or quantity of food be given to them, by means of which their condition may be materially or scarcely at all increased. It has been supposed

by some breeders that, because the ewe is with lamb, an additional quantity of food, and of more nutritive food, should be allowed—nothing can be more erroneous or dangerous, to both the mother and the offspring. There will be too many causes of inflammation ready to act, and to act powerfully, during the time of going with lamb, to permit the least approach to excess of food.

ABORTION.

One of the evils to be dreaded is premature labor. The ewe is not so subject to this as the cow; but there are occasional instances of it. Fortunately, however, it is not so infectious—if this term may be used—it does not spread so rapidly through the flock as through a herd of dairy cows. The causes of abortion are various, and some of them as contrary as possible in their nature. It may arise from starvation, and especially when a cold winter succeeds to a wet summer and autumn. It is also produced in the open and neglected part of the country, from continued intercourse with the ram after the period of gestation is considerably advanced. This is frequently the case among the mountain and the moor sheep. It has often been known to follow the incautious and hasty driving of the sheep into the fold in the later period of pregnancy. A leap over a ditch or a low gate has been followed by abortion, and so has a sudden fright when a dog addicted to worrying sheep has suddenly made his appearance in the flock.

Some very intelligent flock-masters have assured the author that they have attributed it, and satisfactorily so, to the too liberal use of salt. They had adopted the modern and judicious practice of putting salt within the reach of the greater part of their flock, and particularly of those that were supposed to be affected with the rot. A portion of the flock had not access to the salt. Some cases of abortion had occurred in the flocks of all of them, but it was almost confined to those ewes that had partaken of the salt. One gentleman told the author that he had given two ounces of common salt, with a little ginger, to a pregnant ewe that was dull and off her food, and that she aborted twelve hours afterward. Here was a striking coincidence in point of time, but it must be left for future experience to determine how far this, generally speaking, invaluable medicine may be injurious to the pregnant ewe. One favorable circumstance may be stated—that when abortion occurs, from whatever cause, it is rarely fatal to the ewe.

There is one singular and too frequent consequence of abortion, namely, the detachment of a portion or of almost the whole of the wool during the following spring.

There are few symptoms that designate the approach of abortion in the sheep until it is too close at hand to be prevented from occurring. A degree of dulness and of disinclination to food, and a frequent or almost continual bleating, followed by the discharge of a glairy, or yellow, or red, and fetid discharge from the vulva, would sufficiently indicate it, but being so near at hand as not to be arrested in its course. Were it not for the woolly covering of the ewe, the

cessation of the motion of the fœtus, and the sudden falling of the belly, would leave no room for doubt.

The consequence of abortion is uniformly the death of the lamb. In the majority of cases this occurs some hours or days before the fœtus is parted with; in a few instances the lamb is born alive, but it dies in a very short space of time afterward.

The treatment after abortion will depend entirely on the circumstances of the case. If the fœtus had been long dead—proved by the fetid smell of it, and of the vaginal discharge—the parts should be washed with a weak solution of the chloride of lime; some of which may also be injected into the uterus. If fever should supervene, it should be met by the treatment already recommended for that form of disease. If debility and want of appetite should remain, a little gentian and ginger, with small doses of Epsom salts, will speedily restore the animal, care being taken that the food shall not be too nutritive, or too great in quantity.

THE PREPARATION FOR LAMBING.

The 152d day from the admittance of the ram among the flock now approaching, some have recommended that the ewes should be put on better pasture, in order that they may have sufficient strength at the moment of yeaning, and that there may be an adequate supply of milk for the support of the lamb. If, however, she has during her pregnancy been placed on tolerably fair pasture, and is now in moderate condition, this stimulating system is to be deprecated as fraught with evil. Few ewes have sunk under the labor of parturition, unless they had been previously half-starved; and it is seldom that nature fails to supply sufficient nutriment for the young one: but many a ewe has been lost by means of that inflammation for which the stimulating plan lays the almost necessary foundation, and thousands of lambs have been destroyed by a flush of too nutritive milk, of which their weak powers of digestion could not dispose. Many a grazier has sustained considerable loss from having lambed his ewes thinly on strong land, but few have suffered who have placed them more thickly on the pasture.

The ewes should be removed as near to home as convenience will permit, and, according to the quality of the pasture, should occupy as little space as possible, in order that they may be more under the immediate eye of the lamber.

The process of *clatting* should now commence. The ewes should be driven into a fold, and the hair removed with the shears from under the tail and the inside of the thighs, and around the udder. Without this, many a lamb would be prevented from sucking by means of the dirt and filth which had accumulated around these parts; and, after the clatting, the lamber will be more readily able to distinguish the ewes that have lambed. This is a matter of some consequence, for it will not unfrequently happen that the young ewes will desert their lambs, and graze among the others as careless and indifferent as if nothing had happened. The barren ewes will also be readily detected and separated.

Some farmers *clat* the ewes before the ram is admitted into the field, but this is an exceedingly bad practice. The winter is approaching; the ewe will be uncomfortable and cold, and, occasionally, garget, and inflammation of the womb, and abortion, and death, will be the consequences of this thoughtless and cruel disclosure.

The lamber should now be on the watch, day and night. The farmer himself should superintend, or assist in the duties of this season. Few of them are sufficiently aware of their interests here, or the immense losses which they sometimes sustain from the carelessness, or impatience, or brutality of the lamber. "Many lambs," says Mr. Price, in that most interesting part of his valuable treatise of sheep—the management of the ewes and their progeny during the lambing season—"may be lost without it being possible to charge the lamber with neglect or ignorance, although greater attention on his part might have saved many that otherwise perish. The practice of lambing is at times very intricate, and is apt to exhaust the patience of a lamber. Sheep are obstinate, and lambing presents a scene of confusion, disorder, and trouble, which it is the lamber's business to rectify, and for which he ought always to be prepared. Some of the ewes perhaps leave their lambs, or the lambs get intermixed, and the ewes that have lost their lambs run about bleating, while others want assistance. These are only a few of the occurrences which call for the immediate attention of the lamber," and which render it necessary that the owner of the sheep should be on the spot, and should superintend the whole concern. "In the year 1805," continues Mr. Price, "I mentioned this to one of the greatest sheep-owners on the Marsh, and who said that he would watch the lamber more attentively than ever; and the consequence was, that in the following spring he was more successful than he had been in any one of the preceding twenty-five years." Another master, pursuing the same plan, saved 200 pairs of twins out of 800 ewes, whereas he had never before saved more than 100, and, in some years, not more than one lamb to each ewe.

There is one custom, which has been permitted in various parts of England, and that should be for ever abolished—the skins of the dead lambs becoming the perquisite of the lamber. It would be unfair and unjust to charge the lamber with being generally dishonest; but he should not be exposed to the temptation of becoming so: his interest should be inseparably united with, and not in opposition to, that of his master.

The time of lambing nearly approaching, and the lambing field having been selected, a small pound or folding-place should be enclosed in the most sheltered corner of it, into which the ewes and lambs that require assistance may be driven. The fences, and particularly the ditches, should be well examined, and if there is water in the ditch, the bank of it should be carefully guarded. The ewes often select the side of the hedge or ditch to lamb on, because it is usually barer of grass than most other parts of the field. Except precaution has been taken, these will be found exceedingly dangerous spots, for the lambs, when rising, may stagger back into the ditch,

and if he does so he will certainly be drowned. If there is the least danger attending any part of the ditch, and a ewe seems to have selected that for her place of yeaning, she should be driven from it again and again, and especially when the lambing field is left for the night.

Another and smaller field, and with somewhat better pasture, should also have been selected, into which the ewes that may have twins may be turned. There will be less of the confusion which often occurs among these twins, and the ewe will be better enabled to provide for her double progeny.

The lamber should have with him his lamb-crook; a bottle of milk—ewes' milk if possible, and carried in his bosom or in an inside pocket, that it may be kept warm; some cords to tie legs of the ewes that he may have occasion to assist or to examine; a little pot of tar, with two or three small marking-irons, that he may place a different mark on each pair of twins, in order that he may be enabled afterward to recognise them; another little pot of grease or oil, to lubricate his hand, if he should have occasion to introduce it into the womb of any of the ewes; a sharp knife, with a round or rather curved extremity, should it be necessary to remove the lamb piecemeal from the mother; a piece of stout polished iron rod, of the size of a goose-quill, twelve inches in length, and rounded at one end, somewhat like a button-hook, in order to remove from the womb a dead or divided fœtus; a sheep's drenching-horn; a small bottle of cordial, consisting of equal parts of brandy and sweet spirit of nitre; and a strong infusion of ergot of rye.

If the ochre had been applied to the ram, and the order in which the ewes were stained by it had been noted, he would be aware what ewes required the earliest watching. This is seemingly a trifling thing, yet it may be the cause of many a lamb being saved in the course of the season. As he goes his rounds among them he should raise every ewe that appears early in the list, and which he finds lying down, and he should observe whether there are about her any symptoms of approaching labor; and as the ewe-flock had previously been kept as free from disturbance as possible, he should now approach them with additional care and tenderness.

In the more open parts of the country, the ewes, as the yeaning-time approaches, should be folded every night. With commendable humanity, and prudence too, the hurdles are frequently guarded with straw. Mr. Price says that he knew a grazier who used boarded hurdles as a protection to the lambs, and they were lambed in folds, the lamber attending on them during the night. When he lived in Herefordshire the ewes were driven into cots every night during the lambing. They were turned out in the day into an adjoining pasture, and had peas and straw, and sometimes turnips, given to them during the night.

THE LAMBING.

The period of lambing having commenced, the attention of the lamber should be increased. He should carefully observe every ewe

that appears to be in labor. While she walks about and does not exhibit any extraordinary degree of suffering, he should not interfere; nor should he do so if she rises when he approaches, and walks away, unless her labor has been protracted twenty hours or more. He should not be in haste to render his assistance, although she should be continually lying down and getting up again, and showing more impatience or irritability than actual pain: but if her strength appears to be declining, his immediate aid is required. If he has to drive her to the fold or pound, it should be as gently as possible, or he should drive some others with her, in order that she may not be frightened by being alone selected. The early interference of the lamber is always prejudicial, and very frequently fatal. Nature, in the course of twenty or twenty-four hours, will, in the great majority of cases, accomplish that which can not be hurried on by art without extreme danger.

The state of the weather will cause a very considerable difference in the duration of the labor. When the weather is cold and dry, and especially if the situation is somewhat exposed, the progress of the labor will be slow—the throes will be comparatively weak and ineffectual, and the ewe may and should be left a considerable time before mechanical assistance is rendered. When, however, the weather is warm, and especially if, at the same time, it is moist, the throes will be violent, and the strength of the sufferer will be very rapidly wasted; there will be a dangerous tendency to inflammation, and the aid of the lamber is speedily required. Except under these circumstances, no motive of curiosity, no desire to know how the affair is going on, should induce the lamber to interfere while the throes are natural and the strength continues, unless it is evident, without handling the ewe, that a false presentation, or some mechanical cause, prevents the expulsion of the fœtus. When the ewe is nearly exhausted, she will often suffer the lamber to kneel beside her and successfully afford the requisite assistance. If there is a violent struggle between the patient and the lamber, the fœtus will often be destroyed; but his help, when she quietly submits to him, will rarely fail to preserve the mother and her offspring. Let it be supposed that, from certain circumstances, she is driven to the pound, or that she is lying quietly by the lamber in the field. He should first endeavor to ascertain the nature of the presentation. Is the lamb coming the right way, with its muzzle first and a forefoot on each side of it? If the tongue is not protruding from the mouth and becoming almost black, and her strength is not quite wasted, a tablespoonful of his cordial, with double this quantity of the infusion, will probably increase or recall the pains; and the lamb will soon be born. If this is not effected in a quarter of an hour, a second dose of the infusion should be given; and, that being followed by no good result he should try what mechanical assistance will do. He should draw down first one leg and then the other, endeavoring with his finger to solicit or coax the head onward at the same time. If he can not readily get at the legs, he should push the head of the lamb a little backward and downward, when he will probably be enabled to grasp

them. If he does not now succeed, the cause of the obstruction will be sufficiently plain, namely, the two great largeness of the head, which can not readily pass the arch of the pubis; and, therefore, either tying the legs of the ewe, or an assistant keeping her down on her right side, the lamber should grasp the two fore-legs in one hand, and, with one or two fingers of the other, introduced into the vagina by the side of the head, urge it forward with as much force as is consistent with the safety of the lamb. The young one will rarely fail to be extracted by these means, except the head very much exceeds the common size.

The false presentations are not numerous in the ewe, and they are usually accounted for with tolerable readiness. When the ewe in-lamb has been violently hunted by a dog—whether occasioned by the thoughtlessness or brutality of the shepherd, or his boy, or the natural ferocity of the animal—it may be readily conceived how much the situation of the fœtus may be disarranged by the leaps and falls of the sheep. The author has more than once fancied that he could trace a connexion between the unnecessary and rough handling of the shepherd, in the early period of parturition or before the commencement of it, and an altered position of the fœtus. The clatting is a necessary operation, but there needs not a tenth part of the violence that is sometimes used. The connexion between these circumstances is of so frequent occurrence, that, on this account alone, some sheep-masters defer the clatting until after the dropping of the lamb.

The most usual false presentations are—the side of the lamb pressing against the mouth of the womb, which may be readily detected by feeling the ribs—or the back, and then the bones of the spine can scarcely be mistaken—or the breech, when the bones of the haunch will be immediately recognised. The hand, when oiled or greased, should be introduced into the vagina, and, the fœtus being pushed a little back, one of the legs will probably be felt, and may easily be drawn into the passage. Being held there with the left hand, the corresponding leg must be got at likewise, and brought into the passage; after which the delivery will usually be effected without any great degree of trouble. The most dangerous presentations, and the most difficult to manage, are the crown of the head and the breech. In both cases the lamb must be pushed back into the womb. The head must then be raised with the fingers, and brought into the passage of the former case, and in the latter the lamb must be pushed far enough into the womb, to enable the shepherd to bring down the hind-legs, a work not always easily accomplished, or to be accomplished at all, on account of the manner in which they are extended under the belly The principal loss in lambing is to be traced to one or the other of these presentations, and chiefly to the latter.

The lamb having been placed in its natural position, and the labor pains being strong, much may be left to nature; the strength of the animal being supported, and the pains rendered more regular and effective by small doses of ginger and the ergot of rye. The position

however, being unnatural, manual assistance can not be too early afforded. The lamber should not use more force than is absolutely necessary in order to draw away the lamb; yet a considerable degree of it may be quietly employed without endangering the life of either the mother or the offspring. If the ewe is nearly exhausted, the application of this force is imperiously required.

Difficulty sometimes occurs in cases of twin-lambs. They may both present at the same time, either naturally or otherwise. The one that is least advanced must be returned, and the other extracted as speedily as circumstances will permit. The lamb that was returned may then be left to the power of nature, and will speedily follow.

As soon as it can be ascertained that the lamb is dead within the mother, means must be taken for its extraction. There are instances in which the dead lamb has been retained in the womb during a considerable period of time, or, even during the life of the mother, but they are rare; the animal has seldom thriven well; and, in the greater majority of cases, she has pined away and died. The fœtus may sometimes be extracted by the hand; at other times a blunt-pointed knife, and an instrument somewhat resembling a large button-hook, are necessary.

THE CÆSARIAN OPERATION.

Supposing, however, that the lamb is strong and lively, and the mother is not quite exhausted—but it is evident, from the size of the lamb, or from peculiarity of position, that it can not be extracted alive, but that both the offspring and the mother must be destroyed—supposing also that the breed is valuable—would the opening of the belly of the mother, and the extraction of the lamb through the opening, be warrantable? The Cæsarian operation, as it is called, has been performed on the human female, and in a few cases with success. It has also been attempted on the quadruped, and would oftener be so, were the veterinary surgeon supposed to know anything respecting the diseases of sheep.

There are two cases on record in which it was performed on the sheep. A four-year-old ewe was brought to M. Gohier, veterinary professor at Lyons. She had been in labor twelve hours. The pains were now rapidly becoming weaker, and she was nearly exhausted. From malformation of the parts, it was, after numerous trials, and which completed her exhaustion, found to be impossible to deliver her: the lamb, also, was dead. It was determined, as the only chance of saving her, to attempt this operation. An incision, five inches long, was made in her flank; the mass of the intestines was pushed aside; an incision of the same length was made into the womb, and the fœtus and the placenta extracted. The intestines were then replaced, the wound closed by several sutures, and a bandage passed round the belly and over the wound. The operation was unsuccessful, and it had been attempted too late; for the powers of life were exhausted, and the poor animal died on the following day.

On the other hand, the following account appeared in the Farmers' Journal, May 26, 1823: "On the 8th ult., a ewe, the property of Mr. W. Pickering, of Kettering, was in labor. W. Dexter, the shepherd, not being able, with proper assistance, to bring the lamb forward, opened the ewe, and took out the lamb alive; he afterward replaced the intestines, sewed up the wound, and carefully dressed her. In a short time the ewe grazed as before the operation, and, six weeks afterward, both the ewe and her lamb were doing well."

In cases, then, of imperative necessity, and when the death of the mother would otherwise be inevitable, this operation is admissible.

In some lambs that are born apparently dead, the vital principle is not extinct, but it soon would be so if the little animal were suffered to remain on the cold damp grass. Every lamb that is found in this situation should be carefully examined, and if there is the slightest degree of warmth remaining about it, the shepherd should blow into its mouth, in order to inflate the lungs: many a little one has been thus saved.

The lamber needs to trouble himself very little about the expulsion of the placenta, or *cleansing*, although a day or two may pass before it is detached. A couple of ounces of Epsom salts, with a little ginger, may be given, if there should be a longer delay, or if symptoms of fever should be exhibited, but the farmer will do well to avoid the rough barley, or the mistletoe, or, in fact, any stimulant, for there is at this time sufficient disposition to fever, without its being artificially set up.

INVERSION OF THE WOMB.

The womb will occasionally be protruded and inverted after a labor of unusual severity, or when great violence has been resorted to in extracting the lamb. It is usually returned as gently and as speedily as possible, and confined in its situation, either by a suture or by a little iron ring passed through the lips of the external parts. The ring is the surest method, for the twine or thread may cut through the lips of the orifice; and in some cases it is long before the uterus, although carefully returned, will remain in its natural situation.

The French place a *pessary* high up in the vagina, and secure it in its situation by means of the suture or ring. This renders the thing somewhat more secure. A far better operation would be, not to return the womb at all, but to tie a strong ligature round the protruded parts, as near to the mouth of the vagina as possible. The uterus will slough off in the course of two or three days. There will be no bleeding, or the slightest inconvenience, and the ewe will become as healthy and as fat as any of the flock.

Every ewe from whom the uterus has protruded should be fattened for the butcher as soon as she has reared her lamb.

INFLAMMATION OF THE WOMB.

The ewe is subject to two species of inflammation of the womb, one before and one after lambing. The first disease, which is primarily inflammation, rapidly degenerates into dropsy. It usually begins about a month before lambing. Sometimes the ewe increases

in size until the weight becomes insupportable, and then she dies from weakness, before, or shortly after, parturition. In other cases, when slightly affected, she recovers; but the disease seems to have extended to the lamb, which, although it may appear strong when it is first dropped, soon refuses to suck, and dies on the first or second day; and, when examined, is found to contain considerable fluid in different parts of the abdominal cavity. The shepherds term them *water-bellied* lambs. The loss of lambs in this disease, either from bad feeding or some epidemic influence, or both, has occasionally amounted to ten or fifteen per cent. Remedy there is none, for the nature of the disease is scarcely discovered ere the animal dies. The preventive may be, the withholding the dangerous quantity of turnips that is sometimes allowed to ewes at this time, and the substitution of a corresponding portion of dry food.

The inflammation of the womb after parturition usually comes on between the first and fourth day, and especially when any violence has been used in extracting the lamb. It is a most fatal disease, and speedily runs its course. The treatment should be, bleeding and purgatives of Epsom salts. On some farms the loss of ewes from this disease has been two or three per cent.

AFTER-PAINS.

Connected with the last disease, or a variety of it, are the after-pains, or heaving, to which ewes are subject, and which are frequently severe and destructive. They are apparently the same pains, but considerably stronger, which nature uses to expel the lamb.

Mr. Price says that a farmer on Romney Marsh lost several ewes in 1806, in the latter part of the lambing season. They lambed without any assistance, but they were afterward seized with heaving pains. He had removed them from poor to rich keep. Another grazier had thirteen ewes to lamb, during the latter end of the lambing season. The weather became warm, and the grass was luxuriant, and he lost eleven of them from heaving.

This disease is evidently produced by the ewes being too well kept during their pregnancy. It can not be too often repeated, that it is a fatal error to overfeed the ewes at this period, with a view of giving them strength to support their approaching labor. It is a most unscientific and injurious practice, and severely does the farmer suffer for it. But there is some epidemic influence also at work, or the constitution of the sheep is at that time irritable almost beyond belief; for Mr. Price adds: "This inflammation takes place sooner or later, according to the extent of injury received during parturition, or the condition of the body, or the nature of the keep, or the state of the weather; for I have seen ewes, kept alive a long time from the wind being north, perish the moment it changed to the south."

MONSTROSITIES.

Although not so subject to strange variations from the usual form as are swine, cats, and some other animals, the sheep have occasionally strange malformations or multiplications of certain parts—a

duplicature of heads, a duplicature of bodies, and a multiplication of legs, have not unfrequently been seen. The lamber should not be unmindful of this in cases of long and difficult parturition. The introduction of the hand will usually detect any circumstance of this kind; and the lamber should immediately adopt the proper course of treatment. A misshapen animal is a worthless one, except for the museum of the curious; therefore, at all hazard to the fœtus it must be immediately removed by the hand, if possible, or, if that can not be accomplished, by the agency of the knife.

CARE OF THE LAMBS.

It is the duty, and would be the interest, of the farmer, to attend to the comfort of his ewes and lambs at this period; the lambing-field should always be a sheltered one, and there should be a temporary or a permanent retreat for the weakly and the cold. The first care of the shepherd therefore should be to examine the newly-dropped lamb. If they are chilled and scarcely able to stand, he should give them a little of the milk, which he carries always with him, and then take them to some shelter, or place them in a basket well lined with straw. Nursing of this kind for an hour or two will usually give the animal sufficient strength to rejoin its mother.

Nature has given to the sheep, as well as to other animals, an instinctive and strong affection for its young; an affection which strengthens in proportion to the necessities of the parent and the offspring. The more inhospitable the land is on which they feed, the greater their kindness and attention to their little ones: nevertheless it will occasionally happen that the young ewe, in the pain and confusion and fright of her first parturition, abandons her lamb. Some, when the udder begins to fill, will search it out again, and with unerring precision—others, severed from their offspring before they had become acquainted with its form and scent, are eagerly searching for it all over the field with incessant and piteous bleatings. Some will be hanging over their dead offspring, while a few, strangely forgetting that they are mothers, are grazing unconcernedly with the rest of the flock.

There is another circumstance that adds to the confusion. Some of the ewes have had twins; they have inadvertently strayed from one of them, or stupidly or capriciously have driven it from them; and the neglected one is wandering about, vainly seeking its parent, or angrily repulsed by it.

The first thing a lamber has to do is to remedy as well as he can this confusion. He first seeks out for those that have twins, and that have recognised both of their lambs, and, taking his little marking-bottle and marking-iron, he puts a particular mark on each of the twins, by which he may again recognise them, and on each pair he puts a different mark. If they are just dropped, and are weak, he leaves them for a while; but if they are able to travel a little, he drives them into a pound, or into a corner of the field with the other twins, or he at once removes them into another and somewhat better pasture, which he had destined for the twins.

He then looks for the 'ambs that have apparently been abandoned by the mother, and if, as he takes one of them up, it bleats, he will presently find whether there is any responsive call or gaze of recognition. If the mother eagerly calls to it, he has but to put it down and she will speedily rejoin and suckle it, if it is strong enough to raise itself from the ground for this purpose. If the animal is almost exhausted, he must catch the ewe, and assist her to suckle the lamb. It will soon revive, and her love for it will revive too If she merely gives a careless look of recognition, he must suckle the lamb from his bottle of ewe's milk, and leave it for a while; perhaps her affection will return when her udder begins to be distended with milk: if not, he must drive her with others into a fold, and, suffering the rest to escape, try every means to induce her to let the little one suck. There may be considerable difficulty in this at first, but, by the exercise of some patience and tact, he will generally succeed After all, however, he will probably have some lambs upon his hands for whom he can not find a mother, or whose own mother will not suckle them.

On the other hand, he will find some ewes who are gazing mournfully on their dead lambs. With some contrivance he will generally find in her a foster-mother for one of his abandoned ones. He ties a piece of cord round the hind feet of the dead lamb, and the mother, if she has not been unnecessarily frightened by the lamb or his dog, will follow for miles with her nose close to the lamb, and may be led wherever the shepherd chooses.

AFFECTION IN THE EWE FOR HER LAMB.

The Ettrick Shepherd tells another story of the continued affection of the ewe for her dead lamb. "One of the two years while I remained on the farm at Willenslee a severe blast of snow came on by night, about the latter end of April, which destroyed several scores of our lambs, and as we had not enow of twins and odd lambs for the mothers that had lost theirs, of course we selected the best ewes and put lambs to them. As we were making the distribution, I requested of my master to spare me a lamb for a ewe which he knew, and which was standing over a dead lamb in the end of the hope, about four miles from the house. He would not let me do it, but bid me let her stand over her lamb for a day or two, and perhaps a twin would be forthcoming. I did so, and faithfully she did stand to her charge. I visited her every morning and evening for the first eight days, and never found her above two or three yards from the lamb; and often as I went my rounds, she eyed me long ere I came near her, and kept stamping with her foot, and whistling through her nose, to frighten away the dog. He got a regular chase twice a day as I passed by; but however excited and fierce a ewe may be, she never offers any resistance to mankind, being perfectly and meekly passive to them.

"The weather grew fine and warm, and the dead lamb soon decayed; but still this affectionate and desolate creature kept hanging over the poor remains with an attachment that seemed to be nourish

ed by hopelessness. It often drew the tears from my eyes to see her hanging with such fondness over a few bones, mixed with a small portion of wool. For the first fortnight she never quitted the spot; and for another week she visited it every morning and evening, uttering a few kindly and heart-piercing bleats; till at length, every remnant of her offspring vanished, mixing with the soil, or wafted away by the winds."

THE SUBSTITUTE LAMB.

The bereaved and affectionate ewe is induced to follow the remains of her little one to the lambing pound, or to some other convenient place. A lamb that has lost, or been abandoned by its mother is then selected. The head, tail, and legs of the dead lamb are cut off—an incision is made along the belly, and the body turned out, and this skin is then drawn over the substitute lamb. The body of the dead lamb is opened, the liver taken out, and the head and legs of the living lamb, and what other parts the skin does not cover, are smeared with the blood. In the darkness of the night, and after the skin has been warmed on it, so as to give something of the smell of her own progeny, the substitute is put to the bereaved ewe. In the majority of cases the fraud is altogether successful, and the impostor is at once received, and fondled and suckled. This being effected, the shepherd hastens to remove the false clothing; the lamb is returned to her, and "whether it is from joy at this apparent reanimation of her young one, or because a little doubt remains on her mind, which she would fain dispel, can not be decided; but for a number of days she shows more fondness by bleating over and caressing this one, than she did formerly over the one that was really her own."

If she does not take to it at first, she must be compelled to suckle it, and confined, so that she shall not be able to kick or otherwise hurt it. In two or three days she will generally own it, and then they may be turned together into the field without any apprehension or trouble.

Care should, however, be taken, that the age of the substitute lamb and that of the true one should correspond as much as possible. If a lamb lately dropped is put to a ewe whose young one would have been a week or two old, the milk will be too strong, and a purging will be set up, which, probably, no medicine can arrest. On the other hand, if the substitute lamb is a week or two old, and the foster-mother had lost hers in the act of yeaning, her milk will be injurious on account of that purgative quality by which the intestines of the newly-dropped lamb are first excited to action. Sometimes the foster-lamb, frightened or exhausted, will not readily take the teat, however disposed the ewe may be to adopt and feed it. Care should be taken to ascertain whether this is the case, and, if necessary, the lamb should be held while a little of the milk is pressed into its mouth from the udder. This will rarely need to be repeated, for instinct will teach it where to seek and how to obtain its proper nutriment.

AFTER-CARE OF THE LAMBS.

In the course of a little more than a week, the great majority of the ewes will have produced their young, and the lamber will have more leisure for those cases which particularly require his attention. The twin-field will particularly demand his care. He will seldom enter it on the morning without finding some degree of confusion. Some of the lambs will have strayed from or been abandoned by their mothers; and these twin-mothers are sometimes not a little capricious, and especially when, not having sufficient milk for the two, they are teased and worried by the incessant sucking of the twins. In such case they will, in the most determined and furious manner, repulse one of them. Amid the intermingling of the offspring of the different ewes, he will find the advantage of having marked the respective twins, and thus, although not always without regularly drawing them off, he will be enabled properly to separate the respective families: he will relieve the weekly ewe from a burden which she can not support; and, on the other hand, he will reconcile the deserted little one to its unnatural parent, or find a better mother for it. The ewes with their single lambs will not, after a few days, require any extraordinary degree of trouble, but those with twins must be carefully watched, at least until the lambs begin in good earnest to graze. Many a lamb has been stinted in his growth, and irreparably injured, by the insufficient supply of milk which the ewe with twins can afford.

TWINS.

This is the proper place to speak of the desirableness of having many twins. Most breeders are partial to them, on account of the apparent rapid increase of the flock, or the additional quantity of lambs that can be prepared for the market. The question depends entirely on the quantity of land which the farmer holds, and the nature of the soil. If he has pasture enough, and good enough, twins are highly desirable; for at only the usual expense before the yeaning time, the number of his lambs is doubled, and, the pasture being good and the lambs well fed, there will be very little difference in health, condition, or value, between the twins and the single lamb.

The ewe seldom has twins at her first yeaning; and it is fortunate that she has not; for it is seldom that she has any great supply of milk then, and, consequently, the mother and her offspring would equally suffer. The twins are generally obtained from ewes that are three, four, or five years old. The disposition to twinning is undoubtedly hereditary. There are certain rams that have the credit of being twin-getters, and that faculty usually descends to their offspring; but this is oftener the case with regard to the ewe, agreeably to the old couplet:—

> "Ewes, yearly by twinning, rich masters do make:
> The lambs of such twinners for breeders go take."

The female of every species of animal has far more to do with this unusual multiplication of the offspring than has the male; and the

farmer who wishes rapidly to increase his stock through the medium of twins, may go some way toward the accomplishment of his object by placing his ewes on somewhat better pasture, or allowing them a few turnips when November approaches.

THE MANAGEMENT OF THE LAMBS.

We return once more to the lambs, now a few days old. The old ewes will prove assiduous and faithful nurses, but the young ones will occasionally wander from their lambs, and prove inattentive to or have not recognised their bleatings. Such mothers must be separated from the flock, and folded and confined with their young ones, until they appear to be disposed faithfully to do their duty. Some lambs refuse the attention of the mother, and lie weak or sullen, and droop away and die. Some of the mother's milk should be frequently introduced into the mouth; and if that has not the desired effect, a foster-mother must, if possible, be found; or the little churl must be brought up by the hand. There will, generally speaking, be very little difficulty about this. If it is at first fed with warm sheep or cow's milk, by means of a spoon, until it is old enough to suck out of a sucking-bottle, it will soon begin to bleat for its food, and greedily meet the bottle the moment that it is presented to it.

The *cuckoo* lambs will require the particular attention of the shepherd. They are those that are dropped from the middle of April or the beginning of May, when the cuckoo is just making his appearance, and after whom they are named. They are usually the progeny of very young or very old mothers, who were not impregnated so soon as the others, and who generally are not so strong and so hardy as the rest of the flock. Care must be taken that they have sufficient, yet not too nutritive food; and that the diseases to which weakly lambs are subject are promptly attended to.

Some ewes will permit other lambs beside their own to suck them, and then there will possibly be one or more greedy lambs, who will wander about from ewe to ewe, robbing the rightful owner of the greater part of his share. He and his mother must be removed to another pasture, where he will soon learn to satisfy his voracious appetite with the grass.

As the shepherd takes his round he should inspect every lamb. If one does not appear to thrive, he should endeavor to ascertain the cause. Has the mother any or sufficient milk? Are the teats free from disease? He should either supply the deficient nutriment, or provide a foster-mother.

Does the milk disagree with the lamb? Is there any, or considerable purging? The calves and sheep's cordial must be immediately resorted to; and, if necessary, nursing, or separation from the mother.

In two or three weeks, and often considerably sooner, the lambs will begin to nibble a little grass. Is it too luxuriant for them, or has it been eaten down close by the ewes, and is the owner thinking of providing a fresh pasture? Let him beware! There is no situation in which the old advice of not making "more haste and good

speed" should be more carefully heeded than in this. If one paramount cause of disease, and fatal disease to lambs, were selected, it would be a sudden change from bare to luxuriant pasture. It often sets up a degree of inflammatory fever, which no depletion will extinguish, or a diarrhœa which no astringent can check.

The technical term which the shepherd applies to the lamb diseased from this cause is *gall-lamb*. The liver seems to be the principal seat of inflammation, and a great quantity of bile or *gall* is found in the duodenum and small intestines; a portion of it has frequently regurgitated into the abomasum or fourth stomach, and some has entered into the circulation, and tinged the skin and flesh of a yellow color. It is a disease which very speedily runs its course; occasionally carrying off its victims in a little more than twelve hours, and seldom lasting more than three days. Immediate bleeding in the early stage, and afterward Epsom salts, with a small portion of ginger, will afford the only chance of a cure. The poor animal is often condemned and slaughtered at once—that is barbarous work.

CASTRATION.

There is a great difference of opinion as to the time when the tup-lambs that are not intended to be kept for breeding should be castrated. Some recommend the performance of this operation as early as three days after the birth. Mr. Parkinson says that "he has several times cut a lamb the very day that it was lambed, when strong and healthy, and that he never knew one do ill from the operation." The proper period depends a great deal on the weather and on the stoutness of the lamb, and varies from the third or fourth to the fourteenth or twenty-first day, the weather being cool or even cold, and somewhat moist. It would be highly improper and dangerous to select a day unusually warm for the season of the year. The absence of unusual warmth, and the health of the animal to be operated upon, are the circumstances which should have most influence in determining the time.

There are two methods of performing the operation. The lamb being well secured, the operator grasps the scrotum or bag, and forces the testicles down to the bottom of it. He then cuts a slit across the bottom of the bag, in a direction from behind forward, through the substance of the bag, and large enough to admit of the escape of the testicles. They immediately protrude through the incision, being forced down by the pressure above. The operator then seizes one of them, and draws it so far out of the bag that a portion of the cord is seen; and then, if he is one of the old school, he seizes the cord between his teeth and gnaws through it. This is a very filthy practice, and inflicts some unnecessary pain. The testicle being thus separated, the cord retracts into the scrotum, and is no more seen. The other testicle is then brought out and operated upon in a similar manner. Very little bleeding ensues—and the young one may be returned to its mother. An improvement on this operation, and which any one except of the lowest grade would adopt, is to use a blunt knife instead of the teeth. By the sawing action which such

a knife renders necessary the artery is even more completely torn than with the teeth; and yet without so much bruising of the part, and probability of ensuing inflammation. It is by the laceration, instead of simple division of the cord, that after-bleeding is prevented.

Another way of performing the operation is to push the testicles up toward the belly, and then, grasping the scrotum, to cut off a sufficient portion of the bottom of the bag to admit of the escape of the testicles when they are again let down. They are, one after the other, pushed out, and taken off in the manner already directed. The wound is considerably longer in healing when the base of the bag is thus cut away, and the animal consequently suffers more pain. The first is the preferable way, if the incision is made sufficiently long to prevent its closure for two or three days, thus leaving an outlet for the escape of the blood and pus from the inside of the bag.

There is usually little or no danger attending the operation, and yet occasionally it is strangely fatal. In a whole flock not a single lamb will sometimes be lost; but at other times the deaths will be fearfully numerous, the same person having operated on both occasions. Much, probably, depended on some peculiar state of the atmosphere, of the actual nature of which we know nothing at all; and more probably might be connected with a disposition to inflammation in the patient proceeding from too high feeding, or from a debilitated state of the frame, and which had not been observed or properly estimated.

When fatal disease occurs after castration it usually assumes the form of tetanus, or locked-jaw. The village operator pretends to tell when this will or will not supervene. The usual struggles of the animal, or the usual expressions of pain, he does not regard: but when, as he is gnawing the cord asunder with his teeth, he feels a deep and universal shudder of the animal, he says at once that that lamb will die. He is often right about this, and when he is, it can be easily explained. By the fearful torture he has inflicted, he has caused a shock of the whole nervous system, from which the poor sufferer can never perfectly recover.

Occasionally, when the lamb that was selected as a breeder does not turn out well, it is necessary, in order to fatten him and to make his flesh saleable, to castrate him. There are various ways of performing this operation on the young or fully adult sheep. Some proceed precisely as with the horse. An incision is made into the scrotum; the testicle is forced out, the iron clams are put on the cord, which is then divided between the clam and the testicle, and the cautery is had recourse to in order to sear the part and prevent bleeding. This operation usually succeeds well, but it is not every operator on sheep that has the clams or the firing-iron.

The preferable way of operating, is, to tie a waxed cord as tightly as possible round the scrotum above, and quite clear of the testicles. The circulation will here also be completely stopped, and usually in two or three days the scrotum and the testicles will drop off. Accidents have occurred, but which are attributable to the operator: he

has included a portion of the testicle in the ligature, and thus laid the foundation for very great and fatal inflammation; or he has used too large a cord, and which could not be drawn sufficiently tight; or the knot has slackened, and the ligature has pressed sufficiently to produce excessive inflammation and torture, but not completely to cut off the supply of blood. Care being taken in the application of the cord to the exact part, and the tightening of the ligature, the animal seems scarcely to suffer any pain; indeed, the nerves are evidently deadened by the compression of the cord, and no accident occurs.

DOCKING.

There is much variety of opinion among sheepmasters as to the time when this operation should be performed. Some, like Mr. Parkinson, think that it should be done within a very few days after the birth: the ewes on the first, second, or third day, and the male lambs when they are castrated. The author of the "Complete Grazier" would defer it until the lambs are three or four months old. This must depend on the state of the weather, and the health of the animals. No one should dock his lambs when the weather is very cold, because the bushy tails of the animals afford a great deal of warmth. On this account, in particularly exposed situations, it is deferred until the warm weather sets thoroughly in, and by some, and particularly with their ewes, not practised at all. The tail certainly affords both protection and warmth to the udder, and likewise defence against the dreadful annoyance of the flies in hot weather; but, on the other hand, it permits the accumulation of a great deal of filth, and, if the lamb or the sheep should labor under diarrhœa, and the shepherd should be somewhat negligent, the tail may cling to the haunches, and that so closely as to form an almost insuperable obstruction to the passage of the fæces. It likewise can scarcely be denied that the removal of the tail very much improves the beauty of the animal, by the fulness and width which it seems to impart to the haunches.

The operation is a very simple one. An assistant holds the lamb with its back pressing against his belly, and thus presenting the haunches to the operator, who, with a knife, or a strong pair of scissors or forceps, cuts it off at the second or third joint from the rump. A few ashes are then sprinkled on the wound—common flour would do as well, in order to form a coagulum over the part and stop the bleeding. It is seldom that the bleeding will continue long; but, if the lamb should appear to be growing weak in consequence of the loss of blood, a piece of twine tied tightly round the tail, immediately above the dock, will at once arrest the hemorrhage: the twine, however, must be removed twelve hours afterward, otherwise some sloughing will ensue, and care must likewise be taken that the incision is made precisely in the joint, otherwise the wound will not heal until the portion of bone between the dock and the joint above has sloughed away.

GARGET.

The shepherd, and especially in the early period of suckling should observe whether any of the ewes are restless and exhibit symptoms of pain when the lambs are sucking, or will not permit them to suck at all. The ewe, like the cow, or oftener than that animal, is subject to inflammation of the udder during the time of suckling, caused either by the hardness or dryness of the soil on which she lies, or, on the other hand, by its too great moisture or filth, or by some tendency to general inflammation, and determined to the udder by the bumps and bruises, sometimes not a little severe, from the head of the lamb.

If there is any refusal on the part of the ewe, or even disinclination to permit the young one to suck, she must be caught and examined. There will generally be found redness, and enlargement, and tenderness, of one or both of the teats, or sometimes of the whole of the udder, and several small distinct kernels or tumors on different parts of the bag. The udder should be cleared from the wool which surrounds it, and should be well fomented with warm water a dose of Epsom salts administered, and then, if there are no large and distinct knots or kernels, she should be returned to her lamb, whose sucking and knocking about of the udder will contribute, more than any other means, to the dispersion of the tumor and the regular flow of milk. It may occasionally be necessary to confine her in a pen with her little one, in order that he may have a fair chance to suck.

A day, however, having passed, and she not permitting it to suck, the lamb must be taken away; the fomentation renewed, and an ointment, composed of a dram of camphor rubbed down with a few drops of spirit of wine, a dram of mercurial ointment, and an ounce of elder ointment, well incorporated together, must be rubbed into the affected part, or the whole of the udder, two or three times every day. She must also be bled, and the physic repeated. If the udder should continue to enlarge, and the heat and tenderness should increase, and the knots or kernels become more numerous and of greater size, and some of them should begin to soften or evidently to contain a fluid, no time must be lost, for this disease is abundantly more rapid in its progress in the sheep than in the cow. A deep incision must be made into that part of the udder where the swellings are ripest, the pus or other matter squeezed out, and the part well fomented again To this should succeed a weak solution of the chloride of lime, with which the ulcer should be well bathed two or three times in the day. When all fetid smell ceases, and the wound looks healthy, the friar's balsam may be substituted for the chloride of lime.

The progress of disorganization and the process of healing are almost incredibly rapid in these cases, and the lamb may sometimes be returned to the mother in the course of a few days. Both teats may possibly be well, or if but one is perfectly restored to its natural function, there will be sufficient milk for the support of the young one. That season having been got through, it will be prudent--

except the ewe is an exceedingly favorite one—to fatten her for the butcher; for there will always be a tendency to the recurrence of the disease, and a very slight cause will excite it. There are particular seasons, especially warm and damp ones, and when there is a superfluity of grass, in which garget is peculiarly frequent and fatal. Without warning, the udder swells universally with hardened knobs, which sometimes bring on great inflammation, and if that is not stopped in the course of twenty-four hours, part, if not the whole, of the udder mortifies, and the mortification rapidly spreads, and the sheep dies.

SPAYING.

A few weeks after this the spaying of the rejected ewe-lambs will succeed, an operation which will materially contribute to their increase of growth and disposition to fatten. It is singular that this practice should be almost confined to Great Britain and to Italy, for there can be no manner of doubt of the advantage of it. Daubenton, however, in his "Instructions to Shepherds," gives a useful account of the manner in which it is best performed.

At the age of six weeks, the ovaries are grown sufficiently large to be easily felt, and that is the time usually selected for the spaying, being immediately after the first formal examination of the flock. The lamb is laid on her right side, near the edge of a table, with her head hanging down by the side of the table; an assistant stretches out the left hind leg of the animal, and holds it in that situation, with his left hand grasping the shank; and in default of a second assistant, he also holds the two forelegs, and the other hind leg with his right hand. The lamb being thus disposed, the operator, tightening the skin of the part, makes an incision of an inch and a half in length, midway between the top of the haunch and the navel, and penetrating through the skin; another incision divides the muscles of the belly and the peritoneum. A careful operator will, perhaps, make three incisions, the first through the skin, the second through the abdominal muscles, and the third through the peritoneum. He then introduces his forefinger into the abdominal cavity, in search of the left ovary, which is immediately underneath the incision; and, having found it, he draws it gently out. The two broad ligaments, and the womb and the right ovary, protrude at the same time. The operator cuts off the two ovaries, and returns the womb and its dependencies; he then closes the womb by means of two or three stitches through the skin, carefully avoiding the abdominal muscles below; and, last of all, he rubs a little oil on the wound, or he does nothing more, but releases his patient.

The lamb very probably will be unwilling, and perhaps will altogether refuse to suck or to graze during the first day, but on the following days he will feed as usual. In ten or twelve days the wound will have perfectly healed, and the threads may be cut and taken away. The only thing to be feared is inflammation of the peritoneum which was divided in the operation; but this rarely occurs, and, on the whole, there is not so much danger in the spaying of the ewe-lamb as in the castration of the tup.

WEANING.

The time of weaning differs materially, according to the locality of the farms and the quality of the pasture. In a mountainous country, and where the land is poor, the weaning often takes place when the lamb is not more than three months old, for it requires all the intermediate time to get the ewes in good condition by the time of *blossoming*, or to prepare them for the market. In a milder climate, and on better pasture, they need not to be weaned until four months old, and that is about the period usually selected. On the other hand, if the pasture is good, and especially if it is the system or the interest of the farmer to sell his lambs in store condition, they frequently are not weaned until they are six months old. It is very easy to imagine of what advantage a few of these spayed wethers, of which mention has just been made, would be to afford a plentiful supply of milk both for the early and the late weaning time. Nothing would so materially contribute to get the lambs into good heart and strength, when they were early taken from their mothers; or to make them, what may be termed "prime for sale," as a plentiful supply of ewe's milk, even although it might be necessary to force it upon them with the horn.

The first thing to be attended to is, to remove the lambs and the ewes as far as possible from each other. There will be plenty of confusion and unhappiness for a while, and which would be prolonged until it was injurious to both the mother and the offspring if they were able to hear each other's bleating; indeed, it would frequently happen that the ewe could not be confined in her pasture if she heard the continued cries of her young one. Two or three days before they are intended to be parted, the ewes and the lambs should be removed to the pasture which the latter are afterward to occupy, and then, in the evening of the appointed day, the ewes are to be driven away, probably to the pasture which they had occupied with their lambs, or if they are moved to another it should be a poorer and barer one. It will be advisable, although it is not always practised, to milk them two or three times, in order to relieve their distended udders, and to prevent an attack of inflammation or garget. In a day or two they will be tolerably quiet, or if any one should refuse her food, she should be caught and examined, and the state of her udder should be particularly observed.

The management of the lambs will depend on the manner in which the farmer means to dispose of them; but at all events, they should be turned on somewhat better pasture than that to which they had been accustomed, in order to compensate for the loss of the mother's milk. Many farmers are very fanciful as to the provision for the weaned lambs. The clover, or the sainfoin, or the after-math, are selected by some; others put their smaller and more weakly lambs to weed the turnip crops; but there can be nothing more desirable than a fresh pasture, not too luxuriant, and yet sufficient to maintain and increase their condition. A great deal of caution is requisite here. The lamb must not be overgorged, lest some acute disease

should speedily carry him off; on the other hand, he must not be suffered to decline, for if he does he will rarely recover his condition, however good the keep may afterward be.

THE DISEASES OF LAMBS.

The greater part of these have been already hinted at, as the diseases of the different functions passed under consideration.

One of the most fatal is *diarrhœa*, arising from cold, or from some fault in the mother's milk, or from the new stimulus of the grass when the lamb first begins to crop it, or from its overpowering stimulus at the time at which we are now arrived—the weaning time—and when it constitutes the only food of the animal. Little can be added to the advice given on pages 102, 103, except that at weaning time the farmer must naturally expect that the bowels will be somewhat disturbed, and he must not be too much alarmed about it. While the animal feeds and plays, and the countenance is cheerful, there is no danger; but when the eyes are heavy, and the step is slow and sluggish, and the wool begins to look unkindly, no time is to be lost. A gentle aperient is first indicated, in order to carry off any offensive matter that may have accumulated in and disturbed the bowels—half an ounce of Epsom salts, with half a dram of ginger, will constitute the best aperient that can be administered. To that must be added the sheep's cordial, and housing and nursing.

The next disease to be mentioned is one of a mingled character. The milk of the mother is no sooner received into the true stomach—the abomasum—of the lamb, than, by the action of the gastric juice, it undergoes a sudden change; a portion of it is converted into firm curd, while the other retains its liquid form, but is altered in character and is become *whey*. When either the milk or the stomach of the lamb is not in a healthy state, this change takes place in a more decisive manner; the curd is hardened, and retained, and sometimes accumulates to a strange extent; and the whey, pressed out in greater quantity, finds its way quickly through the bowels, and gives an appearance of purging of a light color. In the natural and healthy state of the milk and the stomach, this curd afterward gradually dissolves, and is converted into chyme; but when the one takes on a morbid hardness, and the other may have lost a portion of its energy, the stomach is sometimes literally filled with curd, and all its functions suspended. The animal labors under seeming purging from the quantity of whey discharged, but the actual disease is constipation. It is apt to occur about the time when the lamb begins to graze, and when the function of the stomach is naturally somewhat deranged.

This coagulation of the milk is produced by the gastric juice, and the accumulation of the coagulated mass is to be traced to the suddenly increased power of this fluid when a new species of food, and more difficult of digestion, begins to be received. Mr. Parkinson orders some *runnet*—the preserved gastric juice of the calf—to be mixed with more milk, and poured down as rapidly as possible; for being thus introduced into the stomach in an unchanged state, he

imagines that it will intermix with the food and produce a regular and healthy digestion. The contrary must, of necessity, take place, for the additional quantity of runnet will still more harden the milk, and the death of the animal will be rendered more certain.

The existence of this coagulation may be suspected, when a lamb that has been apparently healthy, and the mother yielding a sufficient quantity of good milk, is evidently distressed, begins to heave at the flanks, can scarcely be induced to move, has its belly considerably swelled, and is either quite costive, or there is a discharge of whitish whey-like fæces. The stomach has occasionally been found perfectly filled with this curd, and which has weighed three or four pounds. The only chance of saving the lamb consists in dissolving this coagulum. The runnet of Mr. Parkinson would harden it still more. Chymistry teaches that, while a free acid produces coagulation of the milk, an alkali will dissolve that coagulum. Magnesia, therefore, should be administered, suspended in thin gruel, or ammonia largely diluted with water, and with these should be combined Epsom salts to hurry the dissolved mass along, and ginger to excite the stomach to a more powerful contraction. Read's stomach-pump will be found a most valuable auxiliary here. A perseverance in the use of these means will sometimes be attended with success, and the little patient being somewhat relieved, the lamb and the mother should be moved to somewhat baser pasture.

Costiveness.—It is generally connected with a bare and dry state of the pasture. The existence of it having been clearly ascertained —there not being, on the one hand, any mechanical obstruction from the wool of the tail being glued over the fundament; nor, on the other hand, any evacuation of small drops of liquid fæces, accompanied by violent straining; the case must be immediately attended to, for it will generally be connected with a degree of fever that may be exceedingly dangerous. Half-ounce doses of the Epsom salts, in solution, should be administered every six hours until the bowels are well evacuated; after which the lamb and the mother should be turned into more succulent pasture.

Fever, and Inflammatory Fever.—The lamb is very subject to fever, rapidly degenerating into inflammatory fever. It is sudden in its attack, and usually confined to the best-conditioned and most thriving lambs in the flock. If taken in time, the loss of a little blood, or the administration of a tolerable dose of Epsom salts, will generally arrest the malady in its commencement.

In some cases, and when the lamb has been hurried on too fastly for the early market, the stage of simple fever will scarcely be recognised, but the animal will be taken all at once with what is termed "*staggers.*" It is precisely the same inflammatory fever which is recognised by the term "*blood*" in cattle. An hour before, the animal seemed to have been in perfect health; then, almost without warning, he becomes evidently ill; the head is protruded, and the walk is staggering, or the lamb stands still, unable to walk at all: and then he falls, and struggles a little while, and dies. The whole flock being exposed to the same exciting cause, and the mysterious, and

powerful, although unsuspected, influence of sympathy being at work, it seems to run through the flock like wild-fire, and a dozen of them have been lost, in less than as many hours. The lancet, physic, and comparative starvation, will afford the only means of cure or prevention.

SORTING OF THE LAMBS.

Soon after the weaning-time, and before the operation of spaying commences, the ewes and the lambs of the whole flock should be carefully examined, in order to draft out of it those that are past service, and the younger ones that do not promise to be any acquisition to the flock. In a *breeding stock* this is absolutely necessary, but in a *flying stock*, or that in which the ewes and the lambs are usually sold before the termination of the year, this may be dispensed with; for if a flock is kept merely for the sake of obtaining an annual profit on the purchase, it is of little consequence whether the sheep are or are not well bred, provided they rear their lambs and get into marketable condition afterward.

It is altogether a different thing with the breeder of sheep. His object is to maintain the purity and acknowledged excellence of his flock, and therefore it is necessary for him every year *to draft*, that is, to set aside for immediate fattening and sale, a greater or less number, and often a considerable number of his young and old stock.

It can scarcely be supposed that there will be any flock in which a great number will not degenerate from the standard of excellence which the breeder had established in his own mind.

The lambs are now particularly under consideration. The sheep-master is, or ought to be, enabled from long practice to form a sufficiently accurate opinion of the future make and properties and value of the lambs; and a little after the weaning is the most convenient and proper time for this examination.

The first object of the owner of the flock is to select a sufficient number of ewe-lambs to fill up the deficiencies caused by the death of some of his ewes, and the barrenness of others. The principle by which he will be guided is a very simple one. By careful management his flock has assumed a certain character. It possesses certain points in which, in his opinion, the value of the breed mainly consists. Then he will immediately draft or condemn every ewe-lamb that is manifestly deficient in these points, and which are sometimes not a little arbitrary. Some breeders (but their number is decreasing) may look to considerable largeness of bone, and, consequently, of carcass; they may connect this with the supposed advantage, but often real inconvenience, of large joints. Others regard the early disposition to fatten—others, again, the tendency to produce twins—and a fourth party may chiefly look to the quality and the quantity of the wool. They are all good points, and the soil, or the market, or various other circumstances, must determine which should be the primary object of pursuit. The lamb that is manifestly deficient in those points should immediately be drafted.

Although the breeder may have his attention mostly directed to

one of these points, yet the lamb that promises to excel in all, or not to be manifestly deficient in either, will be promptly selected; and as the soil and the climate will favor one of these characters more than the others, he will incline to the sheep that seems to possess that character.

The possession of these points, however, will not obtain the ewe-lamb a certain exemption from the draft; for the sheep-owner will still further examine whether this good quality is counterbalanced or neutralized by any glaring defects regarding some other of these qualities, or by any defects at all; and one glaring defect should condemn her, although she may be faultless in every other respect. The defects, as well as the excellences of the parent, are transmitted to the offspring.

The different districts of the country contain a sheep of a certain and decided character. That character may be improved, but can never, with advantage, be essentially changed. It may be connected with one or two, or with all of the principal excellences of the sheep. Then comes the consideration—is there any point about the animal under consideration, that is directly opposed to the characteristic excellence of that district? If so, whatever other good points the animal may possess, it has no right to belong to that flock. The general health, appetite, and growth, should be taken into consideration, and perhaps peculiarities of color will not be quite overlooked.

CHAPTER X.

Diseases of the Locomotive Organs.—The Scab-Lice and Ticks.—The Fly

A VERY great alteration has taken place, during the last half-century, in the size and weight of the bones of sheep. This has been the effect of culture, which, by improving the breeds, has reduced materially the quantity of bones, while the wool and flesh have been improved both in quantity and quality. Every improvement pushed too far degenerates into a defect; and cases are somewhat numerous in which the smallness of the bones has been carried to such a degree, as to produce a very objectionable delicacy and tenderness of constitution. There might have been formerly, and certainly there was, too great a proportion of bone for the meat; but on the other hand, it has been incontrovertibly proved that a strong constitution is not compatible with very small and delicate bones.

The bones of the sheep are less compact than those of the horse or other cattle, and hence the greater liability of the sheep to bony fractures.

FRACTURES.

The very circumstance that renders the bones of the sheep more brittle, renders them also susceptible of a readier union after fracture. If the leg is broken, the divided edges of the bone should be

brought as nearly as possible into apposition, and confined by a few splints, and in the course of a few days new bone will have been secreted, and the fracture repaired. Fracture of the shoulder will be successfully treated if the wool is entirely removed, and a pitch-plaster placed over the whole bone.

SWELLINGS OF THE JOINTS.

Lambs from two to five weeks old are very subject to them, and the best remedy is warmth, and the diseased limb should be well washed in soap and water, and the sore rubbed with some caustic ointment.

FOOT-ROT.

Foot-rot is a disease which always at first, and usually throughout its whole course, is confined to the foot. The first indication of foot-rot is a certain degree of lameness in the animal. If he is caught and examined, the foot will be found hot and tender, the horn softer than usual, and there will be enlargement about the coronet, and a slight separation of the hoof from it, with portions of the horn worn away, and ulcers formed below, and a discharge of thin fetid matter. The ulcers, if neglected, continue to increase; they throw out fungous granulations: they separate the hoof more and more from the parts beneath, until at length it drops off.

All this is the consequence of soft and marshy pasture. The mountain or the down sheep—the sheep in whose walk there is no poachy ground, if he is not actually exposed to infection by means of the virus—knows nothing at all about it; it is in the yielding soil of the low country that all the mischief is done.

In attempting to explain this, the author can not do better than to have recourse to much of the beautifully-graphic description of the healthy foot of the sheep, and the changes which it undergoes, as given by his talented and excellent friend, Professor Dick, of Edinburgh.

The foot presents a structure and arrangement of parts well adapted to the natural habits of the animal. It is divided into two digits, or toes, which are shod with a hoof composed of different parts, similar in many respects to the hoof of the horse. Each hoof is principally composed of the crust, or wall, and the sole. The crust, extending along the outside of the foot, round the toe, and turning inward, is confined about half-way back between each toe on the inside. The sole fills the space on the inferior surface of the hoof between these parts of the crust, and being continued backward becomes softer as it proceeds, assuming somewhat the structure of the substance of the frog in the foot of the horse, and performing, at the same time, analogous functions. The whole hoof, too, is secreted from the vascular tissue underneath.

Now, this diversity of structure is for particular purposes. The crust, like that in the hoof of the horse, being harder and tougher than the sole, keeps up a sharp edge on the outer margin, and is mainly intended to resist the wear-and-tear to which the foot of the animal is exposed. The soft pasturage on which the sheep is occa-

sionally put, presents little, if any, of that rough friction to which the feet of the animal is naturally intended to be exposed. The crust, therefore, grows unrestrained, until it either laps over the sole, like the loose sole of an old shoe, and serves to retain and accumulate earth and filth, or is broken off in detached parts; in some cases exposing the quick and opening new pores, into which particles of earth or sand force their way, until, reaching the quick, an inflammation is set up, which in its progress alters or destroys the whole foot.

The finest and richest old pastures and lawns are particularly liable to give this disease, and so are soft, marshy, and luxuriant meadows. It exists, to a greater or less extent, in every situation that has a tendency to increase the growth of the hoofs without wearing them away.

Sheep that are brought from an upland range of pasturage are more particularly subject to it. This is very easily accounted for. By means of the exercise which the animal was compelled to take on account of the scantier production of the upland pasture, and also in consequence of the greater hardness of the ground, the hoof was worn down as fast as it grew; but on its new and moist habitation the hoofs not only continued to grow, but the rapidity of that growth was much increased, while the salutary friction which kept the extension of the foot within bounds was altogether removed. When the nails of the fingers or toes of the human being exceed their proper length, they give him so much uneasiness as to induce him to pare them, or if he neglects this operation they break. He can pare them after they have broken, and the inconvenience soon ceases, and the wound heals. When, however, the hoof of the sheep exceeds its natural length and thickness, that animal has no power to pare them down, but there long continues a wound, irritated, and induced to spread, by the exposure of its surface, and the introduction of foreign and annoying matters into it.

The different parts of the hoof, likewise, deprived of their natural wear, grow out of their proper proportions. The crust, especially, grows too long; and the overgrown parts either break off in irregular rents, or, by overshooting the sole, allow small particles of sand and dirt to enter into the pores of the hoof. These particles soon reach the quick, and set up the inflammation already described, and followed by all its destructive effects.

There is another circumstance which tends to produce disease in an overgrown hoof. The length to which the crust grows, changes completely the proper bearing of the foot, for, being extended forward, it takes the whole weight of the superincumbent parts. By the continual pressure on this lengthened part, inflammation can not fail of being set up. The progress of the disease is not equally rapid in every instance; sometimes it goes to a certain extent, and the foot to a considerable degree recovers. All the feet may not be equally affected; the fore ones, however, are always the most liable to disease, on account of the additional weight which they carry. Sometimes there is only one foot affected, and that is sure to be a

fore one—sometimes only one hoof of one foot; and occasionally one speedily heals, while the other continues to get worse and worse.

In the first stage of the disease, there is often found nothing but a little overshooting of the edge of the crust, and which is bent in upon the sole, or the edge of the crust is forced asunder from the sole, and a wedge of earth is introduced which presses upon the sensible substance beneath; but at other times the edge of the crust continues to grow until it envelops the whole of the sole. It is seldom that there is inflammation enough excited to throw off the whole hoof at once; but it separates at different parts, and at each part of separation there is new horn formed: this, although soft and unhealthy, and not capable of sustaining pressure, covers, and to a certain degree protects, the sensible parts beneath. By degrees, from increased and long-continued irritation, the parts are no longer able to secrete even this weak horn, but granulations of proud flesh sprout out, and then the work of destruction proceeds in good earnest.

This is the usual progress of the disease; but at other times inflammation seems to be set up at once over the whole of that division of the foot, and there is considerable swelling about the coronet, and matter is formed and breaks out, and sinuses run in various directions, and the whole of the hoof is gradually detached. The upper part of the space between the hoofs becomes inflamed and swelled the whole of the inner surface of the pasterns is sore and raw; ulceration commences—it eats deeply—it spreads on every side—it spreads upward—and the toes are separated from each other almost to the opening of the biflex canal. That canal becomes inflamed—proper inflammation of it is added to that of the sensible parts beneath the hoof—the mucous follicles which it contains, and of which mention has been made, pour out a large quantity of sebaceous discharge, which flows over the forepart of the foot and between the hoofs, and assists in the accumulation of filth by its adhesiveness. In some cases, as has appeared when the diseased state of this canal was examined, the malady commences here. Inflammation of the biflex canal produces much enlargement of the neighboring parts, and the motions of the foot are interfered with, and inflammation and disorganization spread on every side. As these increase, and also the discharge by which they are accompanied, dirt, and gravel and pieces of grass, adhere to the ulcerated surface, and insinuate themselves between the pasterns, there soon becomes one uniform mass of disease.

The ulceration of foot-rot will not long exist without the additional annoyance of the fly. Maggots will multiply on every part of the surface, and burrow in all directions. To this, as may be readily supposed, will be added a great deal of constitutional disturbance. A degree of inflammatory fever is produced. The animal, for a while, shifts about upon its knees, attended by some faithful companion that abandons it not in its utmost need; but at length the powers of nature fail, and it dies from irritation and want.

This is a dreadful account, and yet, after all, the disease is more manageable than could well be imagined, if it is attacked in its earliest stage and treated with proper decision. It will seldom be necessary, or, indeed, proper to adopt any means for the purpose of abating inflammation before the radical mode of cure is adopted. Poultices and emollients will only weaken the parts, and cause the fungous granulations to increase with tenfold rapidity.

The foot must be carefully examined, and every portion of loose and detached horn pared off, even though the greater part, or almost the whole of the hoof may be taken away. The horn once separated from the parts beneath will never again unite with them, but become a foreign body, and a source of pain, inflammation, and fungous sproutings. This, then, is the first and fundamental thing—*every portion of horn that is in the slightest degree separated from the part beneath must be cut away.* A small, sharp, curved-pointed knife, or a small drawing-knife, will be the best instrument to effect this.

If there are any fungous granulations they must be cut down with the knife or a pair of sharp curved scissors, unless they are exceedingly minute, and then the caustic about to be mentioned will destroy them. The whole foot must be thoroughly cleaned, although it may occupy no little time, and inflict considerable pain on the animal. The after-expenditure of time, and the suffering of the patient, wil be materially diminished by this decisive measure.

The foot should then be washed with a solution of chloride of lime, in the proportion of one pound of the powder to a gallon of water. This will remove the fœtor, and tendency to sloughing and mortification, which are the too frequent attendants on foot-rot. The muriate or butyr of antimony must then be resorted to, and by means of a small stick with a little tow tied round one of its extremities, applied to every denuded part: lightly where the surface has a healthy appearance, and more severely where fungous granulations have been cut off, or there are small granulations springing up. There is no application comparable to this. It is effectual as a superficial caustic; and it so readily combines with the fluids belonging to the part to which it is applied, that it quickly becomes diluted, and comparatively powerless, and is incapable of producing any deep or corroding mischief. So far as these foot cases are concerned, it supersedes every other application. The change of color in the part will accurately show to what portions it has been applied, and what effect has been produced.

If the foot has been in a manner stripped of its horn, and, especially, if a considerable portion of the sole has been removed, it may be expedient to wrap a little clean tow round the foot, and to bind it tightly down with tape, the sheep being removed to a straw-yard, or some enclosed place, or to a drier pasture. This last provision is absolutely necessary when the sheep is again turned out; for if the foot is exposed to the original cause of disease, the evil will return under an aggravated form.

The foot should be dressed every day; each new separation of horn removed; and every portion of fungus submitted to the action of the

caustic, with a degree of severity proportioned to the necessity of the case. The new horn should likewise be examined. If it appears to be healthy and tolerably firm, nothing should be done to it; but if it is soft and spongy, the caustic must be lightly applied. The sooner the bandage can be removed, and the sheep turned into some upland or thoroughly dry pasture, the better will it be for the foot, and the health of the animal generally.

The worst cases of foot-rot will readily yield to this mode of treatment, provided the bone has not been exposed, and there are no sinuses running either into the joints or deep-seated parts of the foot, or of the pasterns above. All superficial mischief will be readily repaired, and more speedily than could have been thought possible; but there is always a considerable degree of uncertainty when, the horn being removed, the ulcerations are found to be deep, and certain sinuses or openings betray the existence of greater mischief within the foot. The case will, at all events, occupy a considerable time, and give no little degree of trouble; and it will be for the owner to consider whether he had not better destroy the sheep if he is in tolerable condition, than to run the risk of his pining away, and ultimately sinking under long-continued and increasing suffering.

The sheep that has been attacked by foot-rot should not be suffered to rejoin his companions while there is the slightest discharge from any part of the foot. This goes on the supposition that the foot-rot may not only be produced by the causes that have been mentioned, but that the discharge from the sores and sinuses is of an infectious nature. Some valuable writers, and Professor Dick among the number, have denied the infectiousness of foot-rot. They find sufficient reason for the spreading of this disease through a whole flock, from all the animals having been exposed to the same exciting cause; the feet of all of them having been macerated by the soft and damp pasture on which they have trodden, and the internal part of the foot being thus denuded and injured.

There are many flocks, with regard to which it would be idle to seek for the cause of foot-rot in infection; but the fair question is, have there not been repeated instances in which a diseased sheep has been admitted into a flock that had hitherto been sound, and on pasture that had never given the foot-rot, and in the course of a few weeks or months the complaint has been common among the greater part of them? It is almost superfluous to argue that there are numerous diseases that may be produced by natural causes, and yet are communicable from one animal to another; and on the other hand, that it is difficult or almost impossible to suppose that any infection could be communicated while the hoof remains sound. The question is, are there not cases that can only be accounted for on the supposition of infection?

There can be no doubt that the foot-rot is contagious and the account given of the state of the foot—its degree of maceration, the opening of all its pores, the frequent laceration of the horn, and the absolute exposure of a greater or less portion of the sensitive substance of the foot, the frequent inflammation and sometimes ulcera-

tion of the thin skin which covers the coronet—all these circumstances afford means more than sufficient for the absorption of the virus and the production of the disease.

Some persons have imagined that foot-rot is propagated by means of animalculæ which are bred in the virus of the part, and, falling on the pasture, attack the feet of other sheep. They have gone so far as to describe this insect, and to give it a name—*the pulex penetrans*. The author of this work has often sought for it in vain; and the sources of contagion are numerous and satisfactory enough, without any gratuitous supposition of this kind.

The establishment of this cause of the disease leads to an evident and an effectual mode of prevention; the removal of every sheep that begins to halt, and before the secretion of the virus has commenced. It is bad policy to let the poor animals crawl about the pasture on their knees, day after day; and the sheep-owner will severely suffer for his folly. How long a pasture may be considered to remain tainted it is impossible to decide; but a heavy rain or sharp frost would probably wash the virus away, or destroy its power. The sheep that are removed should not be permitted to return until their feet are perfectly healed, and have been well washed.

It would be a very important inquiry whether some breeds of sheep are more subject to it than others. It would hardly be supposed that there would be any constitutional predisposition, and yet it is an undeniable fact, that although galled and sore feet had occasionally existed in sheep-flocks from time immemorial, the foot-rot, with all its dreadful accompaniments and consequences, was not known until the modern system of improvement commenced—until the carcase was heavier, and its support lessened in bulk—until the flesh and fat were increased, and the bone and horn diminished. Allied to this is another fact, that ewes in lamb are peculiarly subject to foot-rot, on account, probably, of the additional weight which the feet have to support.

The previous habits of the sheep would have a more decided influence in the production of foot-rot. Supposing different lots of sheep were taken from a dry upland pasture, and placed on a moist and richer soil; the consequence would be that the hoofs of all would be macerated and softened, and exposed to injury, but that injury would be proportionate to the pressure upon the wear of the foot. That was a very interesting account, given by Mr. Black, of the progress of foot-rot among certain sheep of different kinds, that had been turned into one of the parks. The black-faced sheep were first affected, and to the greatest degree; next in degree was a cross between the black-faced and the Cheviot; then the Cheviot; and, last and least of all, the Leicester breed. "I was at a loss," says he, "to account for this peculiar liability in the different breeds, while all were exposed to the same circumstances; but by carefully watching the flock, I found that the black-faced got up from their lairs the earliest in the mornings, and, from their being accustomed to roam from the hill to the glen at the approach of daylight, in search of their food, continued from habit to wander through the park before they began to feed. The other breeds possessed this disposition

precisely in the order in which the disease appeared. Consonant with this is the common remark, that South-Down sheep, removed from their native downs to low and moist pasture, are peculiarly subject to foot-rot. A most useful conclusion will naturally be drawn hence as to the kind of sheep that should be selected for different soils and pastures."

As the foot-rot proceeds from the distorted form of the hoof, and the irregularity of the pressure, more than from the simple wearing away of the softened horn, it might be useful and especially on suspected ground, to pare the feet of all the sheep twice in the year—in October or November, and April or May, taking advantage of a wet day or two, when the horn will be more than usually soft. If there should be the slightest appearance of unsoundness at these periodical parings, the proper applications should be made to the feet. The sheep might occasionally be folded on some bare and hard spot, or driven twice or thrice in the week a little way along the road. Prevention would in this, and many other cases, preserve the animal from disease and torture, and the owner from expense and loss.

THE SCAB.

Among the diseases of the skin in British sheep the scab stands foremost in frequency of occurrence and mischief to the wool, the flesh, and the general constitution of the animal. The same disease, or one much resembling it, has been known in some parts of the world from time immemorial.

It assumes different forms in different seasons and on different animals; or there are several varieties of it. A sheep is occasionally observed to scratch himself in the most furious manner, and with scarcely a moment's intermission. He rubs himself against every projecting part of the hedge, against every post, and the wool comes off from him in considerable flakes. When he is caught there is no appearance whatever of cutaneous disease. Mr. Young says, that "the sheep rub themselves in all attitudes—they have clear skins without the least sign of scab—never observed that it was catching—the better the food the worse they became—some few are taken as if mad, jumping and staggering about as if drunk, and they are wasted away, and die in three or four months: the flesh is then quite green, but not stinking."

It is evidently a disease more of the subcutaneous texture than of the skin itself; no satisfactory cause of it has been assigned, nor has any certain mode of cure been pointed out.

The sheep should be caught and housed, shorn as closely as possible, washed all over, and most carefully, with soap and water, and, after that, washed on every second day, and as long as may be requisite, with a lotion composed of equal parts of lime-water and a decoction of tobacco. The corrosive and arsenic lotion should be carefully avoided, as not only without good effect in a disease of this kind, but its application being attended by much danger. A diluted mercurial ointment has been employed with advantage—one part of the common mercurial ointment, and seven of lard—two or three ounces be-

ing well rubbed in every second day, and the application renewed not more than three or four times.

The scab in sheep is much akin to the mange in other animals. It is most common in the spring and early part of the summer. It may be produced by a variety of causes such as bad keep, starvation, hasty driving, dogging, and exposure afterward to cold and wet; thus producing suppression of the perspiration. The prevailing cause, however, is contagion.

The sheep, as in *the rubbers*, is restless—scratching itself with its feet—nibbling itself—tearing off the wool, or violently rubbing itself against every convenient place. When closely examined, the skin will be found to be red and roughened. There has evidently been an extensive eruption, and there still remain on various parts numerous pustules which have broken, and run together, and form small or large patches of crust or *scab*—hence the name of the disease—under which there is a sore surface if the covering is removed too soon. The shoulders and the back, most frequently, earliest exhibit these pustules. The general health of the animal is affected according to the extent and virulence of the eruption; sometimes he pines away and dies, exhausted by continued irritation and suffering. It is a most contagious disease. If it is once introduced into a flock, the farmer may be assured that, unless the tainted sheep are immediately removed, the whole of his flock will become infected, and sadly deteriorated in value; or they will afterward be unfit to breed from in his own stock, and he must not sell them.

It seems to spread among the sheep, not so much by direct contact as by means of *the rubbing-places;* for it has happened, that when the farmer has got rid of his tainted flock, and covered his pastures with a new one, the disease has broken out again, and has been as troublesome and as injurious as before; and this has arisen from the gates, and other rubbing-places, not having been painted or taken away. The time which elapses between the infection and the appearance of the pustules has been ascertained with considerable precision; a circumstance of much importance in any legal inquiry with regard to the soundness of the sheep and the liability of the seller. About the twelfth day the pustules begin to appear, very small and thick; and the animal is then first seen to ferret, or rub himself. The skin also becomes rough, and, on being handled, is found to be covered with small and hard salient points. Four days afterward, from the rubbing and biting of the animal, the summits of the pustules are broken, and a purulent matter, which soon becomes concrete, escapes. This forms the scab, some of the wool falling off, and the fleece generally becoming irregular, hard, dry, and brittle.

The scab in sheep, like the mange in cattle, and the itch in the human being, is caused by certain minute insects of the class *Acari*, which inhabit the pustules or the skin. The disease spreads over the animal and is communicated to the rest of the flock by means of these animalculæ.

The cure of scab, then, lies in the destruction of this insect. This is a simple and most important view of the case. The essence of

the disease is the existence of, and the irritation caused by, this acarus; the cure is the removal or destruction of the tormentor. Then the question as to the form under which the remedy is best applied, is immediately answered. The washes, whether infusions of tobacco, or hellebore, or arsenic, are somewhat objectionable.

A safer and a more effectual method—destroying the insect and benefiting the wool—is the application of a mercurial ointment. It had long been in frequent use among sheep-masters as a cure for the scab, but had got into some disrepute from its having been made too strong, and applied in too large quantities, and thus salivating some of the lambs and the pregnant ewes. The ointment should be made of two strengths. That for bad cases should consist of common mercurial, or Trooper's ointment, rubbed down with three times its weight of lard. The other, for ordinary purposes, should contain five parts of lard to one of the mercurial ointment. The operator should begin with the head of the sheep, and rub a little of the ointment well into it. A shred or furrow should then be made from the head to the tail, and in such a manner that the skin is exposed. A little of the ointment should then be applied with the finger to the skin, along the whole of the exposed surface. Another furrow should then be drawn on either side, and in this way, over the whole sheep, the furrows not being more than four inches apart. When any of the scabs are easily moved, they should be taken away; and, last of all, the whole of the ointment that has been thus applied to the furrows must be well and thoroughly rubbed in. The quantity of ointment applied to each sheep may vary from a few drams to two ounces, one third of the quantity being used for a lamb.

The sheep that has been thus dressed may be considered, at least, as incapable of infecting any of the others; the itching will soon subside; the acari will either be destroyed by the mercury as soon as they appear on the skin, or it will penetrate to their deepest recesses and poison them there; or if, at the expiration of ten days, there should continue to be much uneasiness or itching, another, but a lighter, dressing may take place.

This ointment will have a kindly effect on the roots of the wool, encouraging their growth and that of the natural yolk, and forming a comfortable and most useful defence against the cold of the ensuing winter.

LICE AND TICKS.

There is a species of louse peculiar to the sheep, which occasionally exists in almost incredible numbers, associated with common scab, or connected with or producing an eruptive disease somewhat resembling the scab. This louse—the *hyphobosca crina*—is small and active, and of a brown color, principally tormenting lambs and hog-sheep that are out of condition. Cases have been known, where, after the lambs had lain a little while in the sun, they appeared to be of a brown color; all the lice by which they were infested had crept to the outside of the wool. Tobacco-juice, ointment, and arsenic, are the three remedies commonly used: though the oint

ment is to be preferred, on account of its salutary effect on the skin and the growth of the wool. The weaker of the preparations recommended for the scab should be used.

The *sheep-tick* is a formidable insect. Its instruments for piercing the skin, and almost burying its proboscis and its head within it, are three in number; but it adheres so firmly to the skin chiefly by means of its six legs, which are exceedingly muscular and powerful, and armed with strong, double, serrated claws. It is a nimble animal, and runs quickly enough about the sheep in search of some favorite spot, and, when it has fixed itself there, it will hang for weeks and months together. It seems as if it had lost the power of extricating itself, for it never voluntarily comes away. It is sometimes found as large as a horse-bean. It propagates with much rapidity, although not to be compared with the sheep-louse.

It is useless to attempt to force it from its hold; but it will usually yield to the application of the mercurial ointment well rubbed upon and around, or common turpentine, or even linseed-oil.

THE FLY.

Toward the middle of May, and especially in a woody district, or where the fences are high, certain species of flies begin to deposite their eggs on the wool of the sheep. If the animal labors under diarrhœa, the excrement accumulates and putrefies around the tail, and they will be first deposited there, or in any accidental wound. The maggots are scarcely hatched before they begin to burrow under the skin, and sadly torment the sheep by the severity of their bites. The head is very much exposed to the attack of these insects. A plaster composed of a pound of pitch and two drams of beeswax, melted together, and spread while warm on soft leather, or even on linen cloth, is with much advantage applied to the head when it begins to get sore; sometimes it is used as a precautionary measure before the soreness commences. It covers the head, and heals it if sore, and prevents the future attack of the fly. Some persons apply it while warm, without any leather or cloth, and then scatter a little short wool over it; and others sow the plaster round the head.

When the fly attacks other parts, the wool should be carefully parted or cut away, and some spirit of tar freely applied: this will destroy the maggots that are already deposited, and the smell of the tar will prevent the approach of other flies. Mr. Hogg asserts that the coarsest kind of fish-oil will always prevent the attack of the fly. "I happened," says he, "to be assisting at the sorting of a stock of sheep of the Cheviot breed, when sundry of their heads were broken by the flies. The shepherds brought them out of the fold with the intention of smearing the sore parts with tar. I advised them to anoint them with coarse whale-oil, such as they mix among the tar, having several times seen sores softened and healed by it. Some of it being near at hand, they consented. The flies were at this time settled upon the fold in such numbers, that when we went in among the sheep we could with difficulty see each other; but those anointed

with the oil were turned in among the rest, and, to our utter astonishment, in less than a minute not a fly was to be seen." The wool that is anointed by this oil never quite loses the smell of it until scoured; therefore, a few drops of it, sprinkled on the sheep at the beginning of the season, would probably keep the flies from troubling them during the whole of the summer.

CHAPTER XI.

Sheep-shearing.—The Grazing and Fattening of Sheep.

SHEEP-SHEARING.

The proper time for this operation must depend on the climate, the earliness or lateness of particular seasons, and the breed and condition of the sheep. Some sheep will be ready as early as the middle of May, and especially if they have been neglected in the winter months, and little nutriment could be spared for the fleece, and it has remained on the back of the owner almost a dead substance. It is then more easily and quickly displaced by the growth of the new wool underneath. The sheep may be said to be ready for shearing when the old wool has fairly risen from the skin, and a coat of new wool covers the skin. The extremes of heat and cold are as injurious to the sheep as to other animals, and there should be a complete covering of new wool before the old one is taken away. An early and a warm spring will make a great deal of difference in this respect. Some time in June will generally be the period selected, depending on the state of the sheep, and which the experienced sheep-master will in a moment perceive. It is bad practice, however, to drive it off until the middle or the end of July, under the notion that there will be a longer fibre and consequently a heavier fleece. This will rarely happen; the old fleece will have separated, and a portion of it fallen off, and the fly will have had longer time to be busy, and will sometimes have done irreparable mischief; while the new fleece will have been stinted in its growth, or part of it will be uselessly removed by the shears.

About a week is now suffered to elapse after washing, in order that the fleece may become sufficiently dry, and also that the new yolk, which is secreted with wonderful rapidity, may penetrate through it. The weight of the fleece will be increased, and, what is of much more consequence, a new softness will be communicated to the wool.

It should be received as a fundamental principle of sheep-shearing, that the more perfectly it is performed the greater will be the succeeding crop of wool. The operation is thus described by the writer in the "Quarterly Journal:"—"A barn or shed into which plenty of light can be admitted near the shearers should be selected, and a

part of the floor covered with a large canvass sheet, on which two shearers can operate. The sheet should be nailed down, and a little straw placed under it to soften it as a cushion. The floor of the barn should be swept out quite clean, and a light broom should be at hand, to sweep the sheet when necessary. Everything being arranged a shearer seizes a sheep, and sets it on its rump, and keeps it in this position by resting the back against his own legs. He removes all straws, thorns, burs, &c., that may have adhered to the wool. While thus held, the wool is removed from the head and neck so far as the shoulders, and also from the belly, the scrotum, and the edge of the thighs. The head of the animal is then bent down sidewise, and the shearer, placing a leg on each side of the neck of the sheep, pushes out the opposite ribs by pressing his knees gently against the ribs that are nearest to him. He next shears the wool from the far side with his left hand, from the belly to the middle of the back, and as far down as the loins. The sheep is now turned, and the right hand is employed to shear the wool from the near side. The sheep is then laid flat on its side, and kept down by the shearer with his face toward the rump of the sheep, resting his right knee on the ground in front of the neck, and his right toe being brought to the ground a little behind and below the poll; the head and neck of the sheep are thus confined by his right leg, while he uses his right hand to shear the wool from the hind quarter. In this way the clips of the shears will appear in concentric rings round the body of the sheep. The dirty portions of wool about the tail are then removed by the shears and kept by themselves; the outside of the fleece is folded inward, beginning at the sides, and narrowing the whole fleece into a stripe about two feet wide. This stripe is then rolled firmly up from the tail end toward the neck, the wool of which is stretched out and twisted into a rope, and wound round the fleece to give it a cylindrical shape."

Since the alteration in the character and destiny of the short wool, its total exclusion from the fine cloths, and its increased value as a combing wool, the practice of shearing the lambs has fallen very much into disuse, and the fleece, under the name of hogget wool, is suffered to remain until the second shearing-time; it then produces a considerably higher price than the ewes' wool, and constitutes the greater part of the remuneration which the breeder derives from the fleece.

As soon as the sheep is shorn, the peculiar mark or brand of the owner is placed upon it. It used to be composed of ochre or tar, or other substances which were afterward very difficult to be removed, and therefore lessened the value of the fleece. A superior material is now used, composed of lamp-black and tallow melted together, a small quantity of tar being superadded. This will not be washed away by any storms to which the sheep may be exposed, but will readily yield to strong soap-suds.

The ewe is now dismissed to her lamb. There is, however, a great degree of confusion, neither the dams nor their young being able to distinguish each other so readily as before. This embarrass-

ment seems not to arise so much from the loss of the fleece which may occasion an alteration in their appearance, as from the defect of that long-recognised smell which had characterized each individual personality, and which is also rendered more doubtful by the strong scent of the tar and the tallow, by which they have been newly marked. The brute creation recognise each other more from the smell than the sight, and in matters of identity and diversity appeal much more to their noses than their eyes.

To one circumstance more allusion must be made—namely, the practice of shearing the fat sheep early in the spring. There is scarcely a Smithfield cattle-show in which, in the dead of winter, two or three sheep, just shorn,—certainly in a very neat and tasteful way, and every excellent point of the animal displayed,—are not exhibited. Some excuse may be made for this, for the sheep are brought to the metropolis in closed carts, and are shown in a place where the winds of heaven can not visit them too roughly, but what shall be said of a drove of naked sheep going to market in the early part of March—the east wind cutting like ice, and their eyes and nostrils nearly closed with mucus? This is done for the sake of the little additional profit to be derived from the wool. Is that profit really derived? Has not the unfeeling owner miscalculated the matter? Let him, or let any thinking or humane man, compare two pens of sheep close by each other. In the one the animals retain their natural covering, and they are full of health and vigor; the inhabitants of the other hang their heads with cold and disease, an unpleasant rheum is discharged from their nostrils, and the eye of the sheep, that never deceives when the question of health is to be decided, tells tales, far too intelligibly, of pulmonary diseases, and of constitution undermined, and of everything to disgust rather than attract. Has not the unfeeling owner miscalculated the matter? He will say, perhaps, that the sheep will not travel well in their fleece. In the heat of summer they will not; but when the winds blow chilly, no system can so surely promote the health of the animal, as that which secures to him the feeling of comfort.

SALVING OR SMEARING.

The question of *salving* or *smearing* is entirely one of locality. It is not possible to preserve sheep exposed to the vicissitudes of the weather in high and open districts without the application of some substance to the fleece. The grand object to be gained is protection from the wet and storm; a second is to promote the growth of the wool, and to improve its character. The influence of intense cold would be to stint the growth, and to give a harshness to the quality of the wool. A third object desirable to be accomplished, is to destroy injurious insects, and to prevent those diseases of the skin, to which sheep in exposed situations are exceedingly liable. The smearing mixtures were therefore composed of substances which seemed most likely to accomplish these purposes. The tar, by matting the wool, rendered it almost impossible for wet to penetrate it. It also destroyed the insects which might harbor in the skin, and readily cured many cu

taneous disorders. The butter preserved the tar from becoming too tenacious or concrete, or communicating a certain harshness to the wool; and it also promoted the growth of it, and either gave it softness or preserved its natural softness. Many tons weight of damaged butter were, and are yearly, sent into the Highlands for this purpose. It was, however, found that the tar communicated an indelible stain to the wool, which could never be used for white goods; nor would it take some of the most brilliant colors: therefore, the wool on which the salve was employed was deteriorated in value. It was called the *laid* wool, and was usually from 1*s.* to 2*s.* per Scotch stone of 24lbs. lower in price than the *white* or unsalved wool.

It was a great object with the sheep-breeder to get rid of this stain, by substituting something instead of the tar. Among many experiments, some made by Mr. John Graham, of Newbigging, are deserving attention. He left the tar entirely out of the question, and he used instead of it yellow resin. He melted together 18lbs. each of butter and hog's lard, 12lbs. of resin, and two Scotch pints, or a gallon, of Gallipoli oil—an oil used in washing or cleaning of wool or cloth, taking away every stain, and leaving the wool perfectly white. This was sufficient for fifty-five sheep, and the cost of the smearing of each sheep was about $4\frac{1}{2}d.$ He found this wool, when washed, equally valuable with the white wool, and producing a considerably higher price than the laid wool.

Future experiments must decide on the value of this and other salving mixtures. They are indispensable, and there can be no doubt that, in process of time, a method of preventing the stain of the tar will be discovered.

The use of a small quantity of some oleaginous or greasy application immediately after shearing will likewise be gradually acknowledged. The protection which it affords to the almost denuded skin, its substitution for the natural yolk, which is not in its full quantity immediately secreted, and the softness which it will impart to the wool, are circumstances well deserving of attention.

THE GRAZING AND FATTENING OF SHEEP.

The system of sheep-feeding varies so much with the breed, the pasture, and the winter provision, that it is difficult to lay down any rules that will admit of general application. This difficulty is increased by the very different manner in which farms of the same character are managed according to the caprice of the owner.

A favorite system with many sheep-farmers is to purchase pregnant ewes in the autumn—to keep them on somewhat inferior food during the winter—to give them better provender as the lambing season approaches, and, after that, to improve their keep still more, in order that the lambs may be ready for the early market, and the ewe herself sufficiently fattened before the end of autumn. Others purchase lambs in August or September; keep them in inferior store-condition until the spring, and then fatten them as quickly as possible, and clear the whole off the ground before Michaelmas.

Others, again purchase sheep in store-condition at all seasons

They bring them forward with the best food which their farms will afford, and sell them as soon as they are ready for the butcher.

In many parts of the country the sheep have nothing but what the pastures will afford, except a supply of hay, according to circumstances, during the winter. Considerable management is required here. Sheep suffer materially from being driven backward and forward to different parts of the farm. It is always a considerable time before they will quietly settle down in a new pasture, and sometimes they decline considerably in condition by means of the change and their discontent with their new residence. In an enclosed country, sheep generally do best when they are separated into rather small parcels; they feed more quietly, they eat less, and they waste less. When as many sheep are put upon a fair-sized pasture as it will properly keep, they will be cleared off considerably earlier than if they were put in larger numbers on more extensive grounds. Grass land, in small divisions, will keep and fatten many more sheep than when they are of a greater extent.

There are few circumstances to which the farmer is so inattentive as the nature and quality of the produce of his pasture land whether open or enclosed; the grasses of which particular animals are fondest, and on which they thrive best; the kinds of grass which he should have on his meadow lands; those he should cultivate on his permanent pasture; and those that should cover his higher ground. He can tell which produces the heaviest crop, but he knows not in which the nutritious principle most prevails, or what period of the spring or summer, or how permanent or transient, its best time may be.

The present duke of Bedford entitled himself to the best thanks of the agriculturist when he instituted a course of experiments on the time of flowering and seeding, and the produce and nutritive quality of every known kind of British grass. The time of flowering and seeding, and the weight of produce, and, so far as this goes, the comparative value of each of the grasses at this period, is a most important object to ascertain. The proportion of nutritive matter is still more important: for although it is the case in the quadruped, as in the human being, that it will seldom happen that two individuals will gain equal weights of flesh from equal quantities of the same kind of food, yet when the experiment is tried on a large scale there will be an evident and a very close connexion between the nutritive character of the food, and the thriving condition of the animals.

An account of these experiments was published under the superintendence of Mr. Sinclair, the head-gardener of the duke, but it is now a very scarce and expensive work. Sir Humphry Davy, in his excellent work on Agricultural Chymistry, has given a general view of the result of the experiments; and the reader will probably not be displeased at being put in possession of that which relates to the feeding of sheep. The grasses shall be mentioned in the order of their flowering

The Sweet-scented Vernal Grass *(Anthoxanthum odoratum)* is found on almost every kind of soil, and is a true permanent pasture grass for general purposes, and for early appearance; but it is not

liked by sheep, who will scarcely touch it if there are any white clover or meadow foxtail.

Meadow Foxtail Grass (*Alopecurus pratensis*).—This flowers about May 20, and the seeds are ripened about June 24. On a clayey loamy soil, at the time of flowering, it produces about 20,418 lbs. per acre, every half pound yielding $1\frac{1}{4}$ drams of nutritive matter. When the seed is ripe the produce would weigh 13,000lbs. only, but yielding $2\frac{1}{4}$ drams of nutriment. The aftermath produces about 8,000lbs., and the proportion of nutritive matter in 2 drams to the half pound. So that, although there is a greater weight of produce at the early mowing than at the seed-time, the real value in nutritive matter is not more than 2 to 3. Sheep are fond of the grass; horses do not dislike it, but oxen do not care for it.

Smooth-stalked Meadow Grass (*Poa pratensis*) is eaten by sheep, but they prefer most of the fescues. It is an early grass, but it exhausts the soil.

Short Blue Meadow Grass (*Poa cærulea*).—Common in the drier parts of peaty meadows; nutritious, but not sufficiently so to make up for its unproductiveness. Sheep eat it.

Rough-stalked Meadow Grass (*Poa trivialis*).—In rich moist soils, and sheltered situations, it is a highly valuable grass; but on high and exposed ground its produce is inconsiderable; it yearly diminishes, and dies away in four or five years. It is highly nutritive, and sheep are exceedingly fond of it. It flowers about June 13, and the seeds are ripe about July 10. In flowering-time its produce per acre is about 7,500lbs., and the proportion of nutritive matter is 2 drams; at seed-time the produce is more than 7,800lbs., and the nutritive matter increased to $2\frac{3}{4}$ drams. Its superior value at seed-time is therefore very striking, and should not be forgotten. Contrary to what is the case with many other grasses, the straws at the time of flowering are weak and tender; but as they advance toward the period of ripening the seed they become firm and succulent.

Sheep's Fescue (*Festuca ovina*).—Flowers about June 24, and the seeds ripen about July 10. The produce is comparatively small, and the proportion of nutriment is not more than $1\frac{1}{2}$ drams; but the sheep are exceedingly fond of it. Linnæus affirms that sheep have no relish for hills and heaths that are destitute of this grass. Gmelin, in his "Flora Siberica," says that the Tartars fix their summer residence where this grass is in greatest plenty, on account of its being so wholesome for their sheep. It has a very soft and fine foliage, and therefore may be better adapted to the teeth of the sheep than larger grasses; or it may be possessed of some peculiar sanatory power. Sheep are exceedingly fond of it, and they thrive wherever it is found.

Round-headed Cock's-Foot Grass (*Dactylis glomerata*).—This is an exceedingly productive and nutritive grass; affording in the flowering time $2\frac{1}{2}$, and when the seeds are ripe $3\frac{1}{2}$ drams of nutritive matter. The leaves of the aftermath are very succulent. It is valuable for permanent pasture. Sheep eat it very readily.

Welsh Fescue (*Festuca Cambrica*).—The sheep are as fond of

it as of the common sheep's fescue, while it is more productive and succulent. It is most valuable when the seeds are ripe.

Narrow-leaved Meadow Grass (*Poa angustifolia*).—Flowers at the end of June; and the seed perfect at the end of July. On account of its early and rapid growth it is very valuable for permanent pasture, and sheep like it.

Hard Fescue (*Festuca duriuscula*).—This grass is most prevalent on light rich soils, but is always found in the best natural pastures, where the soil is retentive. It is one of the best of the finer or dwarf-growing grasses; and most valuable for the feeding of sheep. It flowers about the very beginning of July, and the seeds are ripe toward the latter end of the same month. At the time of flowering it is a very productive grass, as a short one, yielding nearly a ton per acre, and affording a proportion of $3\frac{1}{2}$ drams of nutritive matter. At seed-time the general weight of the grass is somewhat more, but the nutritive matter amounts to only $1\frac{1}{2}$ drams. The proportionate value of the grass at the time of flowering is therefore 7 to 3.

Meadow Fescue Grass (*Festuca pratensis*).—It constitutes a very considerable portion of the herbage of all rich natural pastures. It makes excellent hay, and never forms rank tufts. It is much liked by cattle, but sheep comparatively neglect it. It flowers at the very beginning of July, and the seed is ripe toward the latter end of the month. Its produce at flowering-time is nearly three quarters of a ton per acre, and the quantity of nutritive matter is no less than $4\frac{1}{2}$ drams. When the seed is ripe the produce is nearly a ton, but the quantity of nutritive matter is only $1\frac{1}{2}$ drams in the same weight of produce; although not so much in quantity, it is three times as valuable at the beginning as at the end of July.

Rye Grass (*Lolium perenne*).—Mr. Sinclair says of this grass: "Sheep eat it, when it is in the earliest stage of its growth, in preference to most others; but after the seed approaches toward perfection they leave it for almost any other kind. A field in the park at Woburn was laid down in two equal parts, one part with rye grass and white clover, and the other part with cock's foot and red clover. From the spring until midsummer the sheep kept almost constantly on the rye grass, but after that time they left it and adhered with equal constancy to the cock's foot during the remainder of the season." This grass is of almost equal value at the flowering and the seed season—the beginning and latter end of July. It may, however, be objected to it, that it exhausts the soil.

Crested Dog-tail Grass (*Cynosurus cristatus*).—Mr. Sinclair says, that the South-Down sheep appear to be remarkably fond of this grass, preferring it to most of those that have been described, while, on the contrary, the Welsh sheep comparatively reject it, and browse on almost everything else. The grazier in particular districts may, perhaps, take advantage of this.

Fertile Meadow Grass (*Poa fertilis*).—In early growth, the proportion of nutritive matter, and the nutritive quality of the latter math, this grass will yield to few. It continues to send forth a suc-

cession of flowering culms until the frost arrests their growth. It is therefore an excellent meadow grass combined with others.

Yellow Oat Grass (*Avena flavescens*).—Found in dry soils and meadows, and readily eaten by sheep A calcareous manure renders it considerably more productive.

Meadow Cat's-tail Grass—Timothy Grass—(*Phleum pratense*).—It flowers in the third week in June, and the seed ripens in the end of July. Of much value, for permanent pasture, mixed with other grasses, on account of its early herbage, its great productiveness, and the superior proportion of nutritive matter which it contains. At the seed-time, a little before which it should be cut, for if it is cut later the aftermath will be deficient, it contains no less than $5\frac{3}{4}$ drams of nutritive matter. It is most useful for the sheep in the form of hay.

Bents (*Agrostis*).—The different species of bent, although common on almost all poor kinds of pasture, possess no great value. Some of the mountain sheep, however, are fond of them. Mr. Sinclair says that the Welsh sheep will leave all other kinds of pasture in order to graze on the common bent.

The improved system of husbandry, and the extent to which the early fattening of the sheep is carried, have rendered various kinds of artificial feeding necessary. Almost the last vegetable that was introduced, and the most important, is the Turnip. While it supplies a great quantity of most useful food for the sheep, it increases the fertility of the soil in the least troublesome and expensive way. The kind of turnip cultivated must depend on the soil. The common or white field turnip will be preferred on light and sandy soils —the Swedish for the heavier ones. The Swedish turnips are the densest, and least liable to rot; they also are the most nutritive. Half a pound of the Swedish turnip yield 110 grains of nutritive matter; the same quantity of the garden turnip, which is second in the order of nutrition, contains only 85 grains. The quantity of nutrition singularly varies with the size of the root in different species of the turnip. The larger roots of the Swedes afford a greater proportion of nutriment than the smaller ones. In the other varieties the moderately-sized roots have the greatest quantity of nutritive matter.

The frequent and the most economical way of using the turnip is to have two different flocks of sheep succeeding to each other—the fattening and the store sheep. The former are first turned on a portion of the field separated by hurdles; and the power of selection which they have, and of scooping out the roots that please them best, will twice as rapidly add to their condition as if the turnips had been dug up and carted to them on another pasture. The store sheep will follow and clear everything away.

Due caution has been given under the article "Hoove," p. 85, not to suffer the sheep to remain too long at first on this highly-nutritious food. The means to be adopted, should the rumen become over distended, have also been there described.

The turnip-crop is liable to very considerable irregularity of

produce from various causes, and the farmer is occasionally distressed to find food for his sheep. This has led some to have recourse to the POTATO, and with very great success. The quantity of nutritive matter in a given weight of the roots is doubled, and sometimes trebled, in the potato. In the ox-noble, 235 grains are yielded by every half-pound of the root; the rough red yields 305 grains, and the champion not less than 378 grains.

The RYE-GRASS has been already mentioned as an occasional food for sheep. The RED CLOVER is another favorite food, the spring leaves of it yielding a very considerable quantity of nutritive matter. The red clover is far more nutritive than the white or Dutch clover. LUCERN yields still more, and BURNET yet more, nutritive matter.

The MANGEL-WURZEL has lately been tried. The weight of crop produced on a suitable soil has caused this root to be ranked among the profitable ones; but, like all other nutritious roots, it sadly deteriorates the soil. A writer in the "Farmer's Journal" says, that from his turnip-crop failing in 1820, he fed his ewes with mangel-wurzel and hay—25lbs. of the former, and 5lbs. of the latter. From the great quantity of milk which the ewes yielded, the lambs were in high condition. Some other sheep of his increased on the average 8lbs. per quarter in five weeks. Each had 25lbs. of mangel wurzel and 5lbs. of good hay daily.

Another writer in the same periodical states that he fed his ewes on mangel-wurzel. Some of them fed voraciously, and in a short time sickened, and began to lose their wool, a great part of it coming off in flakes, and leaving the skin naked. He therefore recommends to give only a small quantity to the ewes at the time of lambing, increasing it as the lambs increase in size; for, he very properly adds, "to create by any succulent food the greatest possible flow of milk in the ewe when the lamb is young, and not able to draw the whole quantity, is a bad practice."

Potatoes have, as already observed, occasionally been adopted as a winter food, either when the turnip-crops failed, or alternately with them, in order that they might last through the winter. They are given sliced in the cribs or troughs; and when there is convenience for steaming them, few things so rapidly fatten the sheep.

THE BREEDS AND MANAGEMENT OF SHEEP

IN THE UNITED STATES.

The native or common breeds of sheep in this country were introduced from Great Britain, and are so termed in comparison with the improved breeds that have been imported during the present century. They are of two kinds—the polled, or no-horned, and the horned sheep. The wool of the common breeds is coarse; but when kept in good condition, their mutton is of excellent quality, and the carcass of good size.

The principal improved breeds in this country are the Leicesters, the Bakewells, the South-Downs, the Merinoes, and the Saxon-Merinoes, or the Saxons, as they are commonly called. Of all these breeds, a full and particular account will be found in the body of this work, under their appropriate heads. The Bakewells, which are but an improved variety of Leicester, and the South-Downs, have generally been selected from good stock, and will compare favorably with the breeds in England whence they were originally taken. The South-Downs are reckoned the best mutton in the world; and their wool, which is a medium between the long and the short and the coarsest, is inferior only to the Merino. The Bakewells are, however, deemed by many but little inferior, if not equal, to the South-Downs in the flavor of their mutton, though their fleece, which is long wool, is of a quality next inferior to the South-Downs. The carcass of the Bakewell is larger than that of any other sheep, and is on that account deemed the most profitable breed for mutton.

The Merino sheep in this country have not generally been selected from the best stock, and this, together with imperfect and less careful modes of management, will account for our failure to produce wools that will equal the fine fleeces of Saxony and Silesia. "The first importations from Saxony," says Mr. Fleischmann in one of his letters, "were at an early period, when the Saxony flocks had no constant character in their wool, and when a fine and faultless animal was scarcely to be got; and at that period the wool-growers of Saxony had not the experience to give advice to others. Those imported from Spain were of as coarse a nature as those of Saxony, and the whole business of crossing was not conducted with sufficient care. The importations made of late are of a higher degree of fineness; but, as it is generally a matter of speculation on the part of those to whom the well-meaning wool-growers intrust the business of selecting and buying, the selections are made from flocks of less thorough blood, and imperfect character of wool, and the name of being Saxon or Silesian sheep must generally cover all the faults of the chosen stock.

"Those who know the country, the language, and are good connoisseurs, are made the dupes of the cunning speculator. How easy, then, is it to deceive a stranger from a foreign country, whose time is limited, and who has to trust to tha which is told him.

"Nature has destined that the United States shall be the granary of the world, and that its extensive tracts of mountainous land shall raise the necessary material for clothing for its vast territories. The high Allegany will give to innumerable flocks of Merinoes an excellent pasture during the hot days of summer; and when the snow covers the mountains, the spreading plains below the snowy summit will, nearly all the year round, yield sufficient pasture, especially in the more southern parts of the Union, where scarcely a handful of fodder will be required to be laid in for winter. The luxuriant heavy grass of the prairies will answer for the English long-woolled sheep, and for the hardy rackel of Hungary, which furnishes also the most delicious mutton."

Mr. Fleischmann adds: "Experience has shown that only thor ough blood should be employed in the improvement of stocks of all descriptions, and the wool-grower is very desirous to obtain it from a flock of established character, where the wool has all those requisites which the manufacturer requires of Electoral wool. Sometimes inferior flocks produce animals having all the requisites desired; but such an animal will produce lambs inferior to itself, and full of the faults of the parents. Such mistakes, which arise from want of knowledge or misapplied economy in the purchase of stock to breed from, will retard a flock for years, and produces faults which are deteriorating to the whole character of the wool.

"The selection of stock to breed from requires a well-practised eye, to detect the injurious character of the wool upon the different parts of the sheep, and at the same time to select an animal which has the proper shape and strength to suit his flocks, the climate, and the local condition."

The great end to be attained by the farmer in cultivating any breed of sheep, is profit. To gain, then, the greatest produce, several circumstances must be taken into consideration. It is to be observed, that the fine-woolled sheep will not generally produce as excellent mutton as the coarse-woolled breeds. In cultivating the one class, the farmer must have an eye mainly to the fleece; and the other, to the mutton. To ascertain which will be the more profitable, the circumstances and condition of one's farm must be taken into consideration. The native breeds—the Leicesters, the Bakewells, and the South-Downs—are an agile race, and are not to be confined by ordinary fences, which they will leap without difficulty In this country, then, where dogs are not employed, the farmer whose farm can not without difficulty be enclosed by high fences will find the Merinoes more convenient to raise, as they will not ordinarily leap even a common fence. It is, also, to be considered, that the Merinoes, and especially the Saxon-Merinoes, have large and curved hoofs, and are more liable to the hoof-rot if placed on damp or wet pastures. The carcass of the Merino, though much smaller than other sheep, is regarded by many as being nearly or quite as profitable for mutton, in some localities, as the larger breeds. A larger number of Merinoes may be raised to the acre, and in the aggregate, perhaps, as many pounds of mutton, which some con

sider nearly or quite equal to that of the larger sheep. The fineness of the fleece will more than compensate for the extra care and expense required in cultivating the Merino; and on this account, many sheep-breeders have been of the opinion that the Merino, and especially the Saxon or Silesian Merino, would be the most profitable sheep to the farmer. All admit that the soil and climate of almost every part of our country are highly favorable to the cultivation of the finest wool. All that is required is a careful selection from the best Saxon and Silesian flocks, and the employment of the most improved modes of management, which have been so highly successful in Germany, and an outline of which is given in the remarks of Mr. Fleischmann, who is about to publish a more full and detailed account of the culture of sheep.

In regard to the management of fine-woolled sheep in this country, the mode detailed by Mr. Fleischmann has been pronounced by the most experienced judges as the most worthy of attention. From among various letters detailing the modes of management adopted in this country, we conclude these remarks by making a few extracts from a letter written by Mr. A. Beatty, of Kentucky, giving an account of his experience and observations. He says:—

"For some years after I commenced raising sheep, I *housed* them during the winter months, and fed them with hay, sheaf-oats, and occasionally with corn. But afterward, when my pastures became more extensive, I found I could winter my sheep to better advantage by suffering them to run on blue-grass pastures, kept in reserve for them, hauling out and scattering on the turf corn-fodder, when the grass became too short or was covered with snow. This mode of feeding required less labor, was less expensive, and the sheep passed through the winter in better condition, than when housed and fed on hay." Mr. Beatty also remarks that his sheep will do remarkably well on the rankest clover, which enables him to keep in reserve larger pastures of blue-grass for feeding. Sheep do extremely well on clover, and if accustomed to it gradually there is no fear of the hooves—the only thing to dread from rank clover. By good feeding, sheep may be pushed forward in their growth and breeding one year. They will, moreover, be larger and finer in carcass, and produce a greater weight of wool, and that of a superior quality.

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MEDICINES USED IN THE TREATMENT OF THE DISEASES OF SHEEP

ALCOHOL *(Spirit of Wine).*—In the sheep as well as in cattle, every kind of fever, and every kind of inflammation is apt to take on a typhoid or malignant form, and therefore we are accustomed, even while we are combating inflammation, to add a stimulant to our purgative. The cuticular coat of the rumen into which the greater part of the medicine too often finds its way, renders it necessary to add some stimulant to rouse this stomach to the discharge of its contents; therefore ale, gin, tincture of gentian, &c., are, in small quantities, added, if the evident existence of inflammation or fever does not forbid it.

ALOES, as a purgative, is very uncertain in the sheep, and sometimes dangerous. It has been given in doses of one ounce and a-half without the slightest effect. Two ounces have destroyed the sheep, not by superpurgation, but by direct inflammation. The tincture of aloes, however, is a very useful, stimulating, and healing application to wounds. Two ounces of powdered aloes, and a quarter of an ounce of powdered myrrh, should be macerated in a pint of rectified spirit, diluted with an equal quantity of water. This will be found particularly useful in foot-rot when the caustic has eaten away the fungus, and the chloride of lime has removed the tendency to mortification.

ALTERATIVES — The old alterative powder for horses and cattle will be very useful in the cutaneous diseases of sheep. It is composed of Æthiop's mineral, nitre, and sulphur, in the proportions of one, two, and four—about two drams being the average dose, and to be given daily until the disease is cured.

ALUM.—Used as an astringent in diarrhœa of lambs, but far inferior to Sheep's Cordial.

ANTIMONY.—One preparation of it alone is in any considerable repute, the chloride, or butyr, in cases of foot-rot, as described under the treatment of that disease.

CAMPHOR.—Used externally in the form of oil for strains and swellings of the joints.

CATECHU.—An extract from the wood of one of the Acacia trees: an excellent astringent. It is one of the ingredients in the "Sheep and Calves' Cordial."

CHALK.—A valuable antiacid, and also an ingredient in the "Sheep's Cordial."

DIGITALIS *(Fox Glove).*—A valuable sedative, entering into most fever medicines.

EPSOM SALTS.—The very best purgative that can be administered to sheep, and in fact almost superseding every other. The dose from half an ounce to an ounce.

GENTIAN.—The best vegetable tonic, superseding every other. Dose one to two drams.

GINGER.—An excellent stomachic and tonic, and forming an ingredient in almost every aperient drink. Dose, from half a dram to a dram.

IODINE.—Often used with good effect, in the form of ointment, to disperse indurated tumors, and particularly in the udder. The preparation of iodine thus used is the hydriodate of potash, one dram of the compound to seven of lard.

LIME.—The chloride of lime has great value as a disinfectant, and is given in small quantities to get rid of the gas in cases of hoove.

LINSEED OIL.—Used occasionally as a purgative when the Epsom salts will not act, or when great intestinal irritation is expected. Dose, from two to three ounces.

MERCURY.—Mercurial ointment when rubbed down with from five to seven parts of lard, is a safe and almost certain cure for the scab.

MYRRH.—A valuable addition to the tincture of aloes, as an application to wounds.

NITRATE OF SILVER.—An invaluable caustic for wounds inflicted by a mad-dog, or infected by any kind of poison.

NITRE.—An ingredient in the usual fever medicine. The dose rarely exceeds a dram.

OPIUM.—An ingredient in the "Sheep and Calves' Cordial." A colic drink would have little effect without it; and if opium were omitted in the medicines for diarrhœa and dysentery, every other drug would be given in vain.

SALT.—Common salt, has an excellent effect in promoting the condition of the animal, when occasionally sprinkled over its food, or placed within its reach. It is the basis of every medicine yet produced, which really has power over the rot, and in the early stage of that disease, has completely arrested its fatal progress.

SULPHUR is a good aperient, in doses of one to two ounces. It is more valuable, however, as keeping the bowels in a relaxed state when they have been opened by other medicines. It is the basis of every ointment for the cure of mange, and is useful in the common scab. It enters also into the composition of the best alterative powders.

TAR is used with butter for salving the sheep in cold and exposed situations. It is also sometimes used for marking sheep, and is a very useful dressing in foot-rot.

SPIRIT OF TAR.—A useful application to the feet in foot-rot. It also has great effect when applied to the parts that have been struck by the fly. It destroys the maggots already formed, and no fly will deposite her eggs where this liquid has been used.

OIL AND SPIRIT OF TURPENTINE.—These are often very useful applications to wounds, and especially those of long standing. They also prevent the attack of the fly. Common turpentine is added to milder ointments, in order to make them somewhat stimulating, and give them a digestive character.

ZINC.—The carbonate of it is mixed with lard, in the proportion of one dram to seven, and makes a very excellent emollient and healing ointment.

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